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HAMILTON INDUSTRIAL PARTICULATE - SOURCES AND DEPOSITION

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Hamilton Particulate - Sources and Deposition

1. Background

High concentrations of airborne particles are found in Hamilton during atmospheric inversion conditions. These particles seem to radiate from the industrial area when they exceed environmental standards.

Debate continues about the relative contributions of industrial processes, fugitive dust blow off and vehicle traffic. Resuspension of settled dust by traffic complicates the issue.

Determining how much individual industrial sources contribute is difficult because of the large area of the industries and of individual companies within that area. In fact, a single process within a steel company can be larger than a complete manufacturing plant elsewhere.

One potential direction of the Clean Air Program is to target overall percentage reductions in major pollutants. More information would be needed to achieve such an objective in Hamilton. There is also concern about atmospheric deposition into the harbour, since Hamilton Harbour is a Remedial Action Plan area under the Great Lakes Water Quality Agreement.

In order to better define the sources of suspended particulate in air so as to assist our ongoing abatement program, a network of suspended particulate samplers and deposition (dustfall) samplers were stationed within Stelco and Dofasco and elsewhere in the industrial zone between July 26 and November 20, 1991. Measurements from the samplers are analyzed to help determine the relative importance of different particulate sources within industrial boundaries.

Objective of Study

Pinpoint specific sources within the industrial area to assist in abatement of particulate pollution emissions.

2. Methodology

Eleven air monitoring stations were installed at the locations described in Table 1 and illustrated on the map in Figure 1. Photos of each station are given in Appendix A.

High volume samplers (hivols) to measure total suspended particulates were run at each station. A hivol draws a known volume of air through a pre-weighed filter, usually for a 24-hour period. The exposed filter is weighed and the difference (weight of solids on filter) in conjunction with the air flow is used to calculate a concentration in micrograms per cubic metre (ug/m^3). In this particular survey, samples were run for 12 hours each, alternating between 6:00 a.m. and 6:00 p.m. starting times (day sample or night) every third day. All samples were analyzed for a scan of eight metals, plus elemental (free) carbon, total carbon, and carbonate.

At 9 of the 11 stations dustfall jars were used to measure heavy particulate deposition. Dustfall is collected passively in plastic containers normally during a 30 day exposure time. The dust collected is weighed and expressed as a deposition rate of grams/square metre/30 days. In this survey, samples were exposed for seven days (although data were still expressed in the normal units). All samples were analyzed for total loading and a scan of 16 metals. The laboratory technique renders the metals data to be only semi-quantitative in nature.

To aid in source identification, known point sources of particulate in the industrial zone are indicated in Figure 2.

All suspended particulate and corresponding wind information are given in Tables 2a-2f and dustfall results are given in Tables 3 and 4a-4i. Guidelines and objectives are indicated in these tables.

3. Variations Over Time

A notable aspect of the suspended particulate results was a clear decrease in concentrations as the survey progressed at all 11 stations. Figures 3a and 3b illustrate this observation for four of the stations. This observation was also noted by the Ministry's routine network of industrial zone monitors (Figure 5). Dustfall concentrations did not exhibit this same trend as shown by the examples given in Figures 4a and 4b. Routine network stations actually showed a slight increase in dustfall levels although levels in comparison to the months before and after the survey were very low.

The decreases observed by the special survey during the fall inversion season run counter to the norm as does the post-survey increase during the winter when levels could be expected to be lower due to frozen or wet grounds, precipitation, etc.. It may be that the major industrial facilities were run with greater attention to minimizing pollutant releases during the special survey.

4. Validity of Dustfall Results

Owing to the lower than expected dustfall concentrations measured, there was some concern about the seven day exposure times. With many samples lacking any rain water, it was through possible that accumulated dust in a dry jar could be blown out. Thus, during the final three weeks of the survey, distilled water was placed in the jars prior to exposure to see if this caused a change. However, no significant difference could be observed in the data following this change in practice.

Further, three of the jars were located fairly close to routine network stations. The average of the four or five weeks of consecutive samples from these stations were compared to the approximate equivalent monthly exposure of the regular network results for August, September, and October. Results are given in Table 5 and show a good comparison. Thus, it can be concluded that the weekly exposure period and lack of use of distilled water for most of the survey did not adversely affect the quality of the dustfall results.

5. Particulate Composition

The suspended particulate samples were analyzed for a scan of eight metals and carbon. The carbon parameters (free, total, and carbonate) and iron and manganese yielded the most significant concentrations and variability. The other metals, namely copper, nickel, lead, cadmium, chromium, and vanadium all showed low levels and little variation. Consequently, the data analysis of TSP focused on iron, manganese, and the carbons.

For dustfall, iron, manganese, and zinc were the most prominent metals detected and data analysis focused on these elements. The other 13 metals showed low concentrations and thus, the analysis of dustfall focused on iron, manganese, and zinc.

6. Spatial Variations

6.1 Suspended Particulates

Spacial variations of the overall geometric means of are depicted in bar graph and map isopleth formats.

The TSP and carbon parameters showed similar variations as shown by the bar graphs in Figures 11-13. Together with the isopleth map in Figure 6, concentrations were highest in the centre of the Stelco/Dofasco properties. The highest TSP mean was 120 ug/m^3. Conversely, the Beach Station (29547) recorded only 3 of 36 and the J.I. Case (29531) only 4 of 35.

Iron and manganese figures 7, 8 and 17, 15 show "hot spots" primarily on Stelco property at sites 29535, 29537, and 29533. These stations surround the Stelco Basic Oxygen Furnace (BOF) facility. The "iron" objective of 25 ug/m^3 is actually for the component FE_2O_3. Translating this to pure iron (as is measured) an approximate comparable iron target is 17 ug/m^3. This figure is exceeded in 8-12 samples at each of the three stations. The manganese objective of 2.5 ug/m^3 was exceeded only once at one station (29533). Neither objective or target was exceeded at any of the other stations.

Most of the elevated suspended particulate concentrations occurred during the early parts of the survey. Figures 20-22 depict the concentrations measured on three particular days of high loadings. In each case, levels increased northwards on company properties.

6.2 Dustfall

Total dustfall average did not exhibit spatial variations lending themselves toward isopleth plots. The bar graph in Figure 16 does show the maximum levels were measured at site 29535 - Stelco Chem Lab. Of the 17 weeks of sampling, 16 exceeded the monthly objective of 7 grams/square metres/30 days at this site. The next highest station average belonged to 29541 - Dofasco Harbour, but station 29543 - Dofasco Galvanizing Line showed the next highest number of exceedence - 10.

The iron in dustfall results in Figures 9 and 17 duplicate those found for iron in TSP in Figure 14. Station 29535 - Stelco Chem Lab displayed the highest mean by far, indicating a local source near that station.

Manganese is dustfall in Figure 18 showed generally similar variations as manganese in TSP (Figure 15) but the differences were not as severe. Levels on or near Stelco property were highest.

Zinc in Figures 10 and 19 showed mostly low levels but two sites on Dofasco property, 29541 - Harbour and 29543 - Galvanizing Line, clearly stood out from the other stations as "hot spots". Unfortunately, zinc cannot be analyzed in the glass fibre filters used for the TSP measurements, to confirm these observations.

7. Day Versus Night - Suspended Particulates

As mentioned in an earlier section, the hivol sampler ran for 12 hours each, alternating between 6:00 a.m. and 6:00 p.m. starting times, allowing for day time and night time samples. The night samples are marked with an "N" in the data Table 2a-2f. For each station, the night means were statistically compared to the day means using the Student-T test. The eleven comparisons are illustrated in Figure 23 and in all cases there was no significant difference between day versus night at the 95% confidence level.

This test was parametive in nature and assumed a normal distribution in the data. As this assumption is probably not correct, the data were also compared using the less powerful non-parametive Mann-Whitney U-test. This test also indicated no significant difference between day and night means at the 95% confidence level.

8. Effect of Rainfall on Particulate Levels

Rainfall normally has the effect of reducing airborne particulate levels by direct washout or by reducing fugitive emissions off roads, stockpiles, unpaved lots, etc..

During the hivol sampling schedule there were four days of significant rainfall. The parameters TSP, free carbon, and total carbon were analyzed and isolated in Table 6. The geometric means from these rain samples are compared to the overall means in Figures 24 and 25. Most of the stations did show significant decreases in TSP and carbon levels; 30-36% on average.

Greatest decreases were observed at the Stelco Chem Lab site (29535), the site of highest dustfall loadings and high suspended particulates. This would indicate a lessening in fugitive dust surrounding the area. However, plume washout can be another factor as shown by station 29543 - Dofasco Galvanizing. This site was located 85 feet above ground, very remote from fugitive ground level dust, and still recorded a drop in TSP of over 40%. Plume washout could be assumed to have caused this decrease.

The small samples sizes (3 or 4 dates each) preclude precise determination of this effect. Also, the small amount of rainfall days cannot be used as an explanation for the much reduced suspended particulate readings as the survey progressed.

9. Correlation With Wind Direction

9.1 Suspended Particulate

The suspended particulate data (TSP, iron, manganese, and carbons) were correlated with the wind direction frequency figures (hours per sample) given in Tables 2a-2f. Wind directions from Ministry of the Environment (MOE) station 29026 - Woodward Avenue were utilized and the resulting correlation coefficients (r) are given in Tables 7a-7k.

As a guide, a perfect correlation would yield an r=100. Owing to the many and varied influences that can affect hivol data, positive "r" values greater than say 0.40 can be considered significant. The square of these values multiplied by 100 determines the percentage variation in the concentration data that the variable (wind direction) accounts for. For instance, if x versus y correlates with an r=0.50, "x" accounts for 25% of the variation in "y".

In each table of 7a-7k, dual correlations were performed. The first half utilized all of the data. However, many of the samples, particularly the night samples, included many, if not all, calm hours which yielded zero hours of any wind direction. This tended to confound the analysis and produced mostly weak positive correlations. To compensate, the night samples were eliminated and the day time samples were re-analyzed. These results, presented along side the overall results in each table, strengthened the positive correlations in most cases. The positive correlations indicate the directions most affecting the stations and are illustrated in Figure 26. A station-by-station run down of source identification follows.

9.1.1 29531 - J.I. Case (Table 7a)

The northeast direction was clearly dominant. This direction indicates Stelco sources to be the primary source of concern here. The coke ovens/blast furnace, BOF, Heckett, etc. are all potential contributors.

9.1.2 29533 - Stelco Crane Runway (Table 7b)

This site correlated best with southwest and west directions. The Stelco BOF, Heckett, coke ovens, blast furnaces, and coal/ore piles are all potential contributors. Fugitive dust sources are also potential contributors as shown by the photo in Appendix A. Large areas of unpaved dusty lots lie in the immediate vicinity of the monitor, although it was made as remote as possible from fugitive sources, 40 feet above ground. The fact that this station yielded the highest manganese levels in the survey may be indicative of the BOF being the primary source.

9.1.3 29535 - Stelco Chem Lab (Table 7c)

Westerly winds were the main direction here. Stelco coke oven batteries and/or "D" blast furnace would appear to be primarily in this direction. Second highest iron/manganese levels may be more indicative of the blast furnaces. Northwest winds yielded weaker correlations possibly pointing at "E" blast furnace and/or the BOF or coal/ore pile.

9.1.4 29537 - Stelco East Filtration (Table 7d)

The various elements correlated with different directions. Carbon correlated with north, northwest, and east winds, possibly pointing at the Stelco Heckett operation (north) and the Dofasco coke ovens to the east. Iron correlated with northwest. There are no apparent stationary sources of iron in this direction. As this station yielded the highest iron levels in the survey, the most obvious source of iron would appear to be the Stelco BOF to the northwest or Dofasco blast furnaces to the east. Perhaps localized wind effects render the Woodward Avenue wind data unrepresentative.

9.1.5 29539 - Stelco Office (Table 7e)

TSP did not correlate well with any direction. Carbon correlated strongly and iron weakly with northwest pointing at either the coke oven batteries and/or the "D" blast furnace. The nearby Chem Lab and J.I. Case stations also pointed at this area. Manganese correlated with northeast - source unknown, but manganese levels were among the lowest levels measured (as were those for iron).

9.1.6 29541 - Dofasco Harbour (Table 7f)

All parameters correlated strongly with southwest winds. The single highest TSP/carbon concentration was measured here on August 22 during southwest winds. The most obvious source is the adjacent coal pile area. This is confirmed by the relatively low iron/manganese levels.

9.1.7 29543 - Dofasco Galvanizing (Table 7g)

The name for this station may actually be a misnomer but will be retained for simplicity.

All parameters correlated strongly with west winds and weakly with northwest. While this points at much of the neighbouring Stelco property, it also points at Dofasco's own line of blast furnace/cast houses immediately in the forefront of the station. As well, this station recorded the highest free carbon levels in the survey on average and as such, both the Dofasco No. 1 and No. 2 coke oven batteries must be considered as potential contributors as they lie on the fringes of westerly sector.

This station's elevation - 85 feet above ground, essentially eliminated ground level fugitive dust sources as contributors to the measurements. The elevated readings at this site were mainly due to point sources.

9.1.8 29545 - Dofasco Quality Center (Table 7h)

All parameters correlated best with east and northeast winds. This clearly points at the Dofasco No. 1 melt shop/No. 1 coke oven battery area which lie nearby.

9.1.9 29547 - Beach Blvd. (Table 7i)

Most parameters correlated best with west winds but the TSP correlation was weak. This direction essentially points at the entire industrial zone

but further analysis in later sections of this report attempt source identification.

9.1.10 29555 - Strathearn/Burlington (Table 7j)

This site measured low concentrations of most parameters. Very weak correlations with east winds, particularly for free carbon, indicate a small effect by Columbian Chemical.

9.1.11 29557 - Parkdale North (Table 7k)

TSP and carbon correlated with southwest winds; the carbons strongly. This indicates Columbian Chemical to be the primary source. The actual concentrations however were much less than observed in the midst of the steel mills.

9.2 Dustfall

The dustfall weekly exposures were also correlated with the weekly wind direction frequencies given in Table 8 and illustrated in Figure 27. The correlation coefficients are given in Table 9. The weekly exposures minimize resolution and together with the impression of the dustfall measurement, the correlations must be viewed with some caution. For these reasons, the TSP correlations are better at pinpointing sources but those for dustfall can be used for corroboration.

9.2.1 29531 - J.I. Case

Total dustfall and iron best correlated with northeast and east winds, similar to the hivol results. The manganese and zinc results correlated best with south winds but these correlations may be

incidental due to the very low frequency of south winds shown by Figure 27. The Stelco coke oven/blast furnace area is probably the dominant influence on this station.

9.2.2 29533 - Stelco Crane Runway

Best correlations, although weak, occurred for southwest and west as the hivol results showed. Positive results for south and southeast may be incidental due to the low frequency of these directions.

9.2.3 29535 - Stelco Chem Lab

Discounting the southeast correlation again, the best correlations occurred with west winds similar to the hivol results indicative of the coke oven/blast furnaces. Carbon was also positive. Zinc correlated with southwest.

9.2.4 29537 - Stelco East Filtration

Northwest (and calm) correlated best similar to the hivol results suggesting that the Stelco BOF was the prime source. East winds from Dofasco did not correlate as they did for hivol. Southwest winds correlated weakly for zinc.

9.2.5 29539 - Stelco Office

Calm winds correlated best but west and northwest yielded positive correlations for total dustfall and zinc respectively similar to the hivol results indicative of the blast furnace/coke oven area.

9.2.6 29541 - Dofasco Harbour

Southwest, west, and northwest, all from the general direction of the coal piles, correlated best, similar to the hivol results. The northwest direction may indicate ship unloading operations to be a source.

9.2.7 29543 - Dofasco Galvanizing

West and northwest from the general direction of the Dofasco blast furnace/coke ovens correlated best, similar to the hivol results. North winds were also positive for manganese and zinc.

9.2.8 29545 - Dofasco Quality Center

Similar to hivol, winds generally from the northeast/east were the dominant directions indicative of the nearby coke ovens and No. 1 melt shop.

9.2.9 29547 - Beach Pier 25

Correlations were unlike hivol in that southerly or northwest winds (rather than west) correlated best. The southerly correlation may be incidental only. There were only two weekly exceedences of the monthly objective here and both occurred in the weeks containing maximum southerly winds. However, these weeks contained far more west and southwest winds. This argument can be true for any of the dustfall correlations for low frequency winds.

10. Upwind/Downwind Analysis

The hivol data were further analyzed by isolating days of dominant wind directions. Stations that would have been upwind and downwind of particular point sources were then compared in bar graph formats.

As can be seen from Figure 28, west and southwest winds were by far the dominant directions which occurred during the survey followed by northeast/east. These were the only directions which could be used which could provide enough data for an accurate analysis. Data from all stations on southwest, west, and northeast directions are given in Tables 10-18. The tables were subdivided into Stelco, Dofasco, and Columbian Chemical stations.

The upwind/downwind analysis was determined the two methods:

1. For each wind regime one station downwind of a source of group of sources was compared to one or more stations on the upwind side of that source.

2. Single station averages during different wind regimes were compared which would place that station either downwind or upwind of a particular source.

It should be noted that the four rain dates were not included in this analysis. The following will summarize the results around major industrial facilities.

10.1 Upwind/Downwind - Multiple Station/Same Day

The comparisons illustrated in Figures 29-41 show relative magnitudes in order to appear in the same graph. The actual figures should be divided by 10 to yield microgram/cubic metre

concentrations for iron, free carbon, and total carbon and by 100 for manganese and carbonate. The TSP figures are unchanged.

10.1.1 Stelco BOF/Heckett - Figure 29

Days of southwest winds placed station 29533 - Crane Runway downwind of these facilities and 29535 - Stelco Chem Lab upwind. The Figure shows no additive effect of the subject sources (4 of 6 parameters gave higher upwind averages). Only TSP and manganese showed an additive effect. Considering the dustiness of the immediate area near the sampler, and the BOF's apparent effect in some of the other analyses, this result tends to show the severity of levels at the Chem Lab which would presumably be affected by "D" blast furnace or coke ovens under these winds.

10.1.2 Stelco Blast Furnaces/ Coke Ovens - Figure 30 and 31

Days of west winds placed stations 29537 - East Filtration and 29535 - Chem Lab downwind and 29531 - J.I. Case upwind (Figure 30). Both downwinds were significantly higher than the upwind, the Chem Lab more so due to its closer proximity to the subject sources. Iron levels were slightly higher at the Filtration site than at Chem Lab, indicating the BOF may have had some contribution at the former.

Days of northeast winds placed 29531 - J.I. Case downwind and 29535 Chem Lab and 29539 - Office upwind (Figure 31). In most cases, the downwind J.I. Case site was about equivalent or much less than the two "upwinds" particularly the Chem Lab site. Iron and carbonate concentrations were extremely high at the Chem Lab , the highest observed for any subset in the survey. Under northeast winds this site was downwind of the Heckett facility and possibly the BOF if localized wind patterns were different from Woodward Avenue.

10.1.3 Stelco Coal Piles - Figure 32

Days of west winds placed 29533 - Stelco Crane Runway downwind and 29539 - Stelco Office upwind (of the entire plant). Large differences were observed for all parameters indicating a severe effect. The Heckett facility may have contributed as shown by the very high iron differential. The very high carbonate differential may indicate that the Heckett site is a significant contributor of this component. Visible white dust clouds attest to this.

10.1.4 Dofasco Coal Piles - Figure 33

Days of west winds placed 29541 - Dofasco Harbour downwind and 29533 - Stelco Crane Runway upwind. The upwind readings at Stelco Crane were mostly higher (or slightly lower in two cases) indicating that Stelco sources were major contributors rather than the Dofasco coal piles. The Stelco BOF, Heckett, coal piles, etc. are all possible.

The elevated carbonate levels were probably from Stelco Heckett as noted above.

The two key parameters, free and total carbon, were indeed the two that were marginally higher at the downwind site and thus the Dofasco coal piles did contribute there to carbon levels.

10.1.5 Dofasco Melt Shop (BOF) and #1 Coke Plant - Figure 34 and 35

Days of southwest winds placed 29543 - Dofasco Galvanizing downwind and 29545 - Dofasco Quality Center upwind (Figure 34). The carbon and iron parameters showed significantly higher downwind concentrations indicating the subject sources to be substantial contributors. The TSP difference was not as large. The upwind station 29545 was downwind of traffic on Burlington Street and the Dofasco Foundry. Further, the downwind site was located on a very high roof, 85 metres above ground, making it remote from ground sources helping to explain this observation for TSP.

The reverse situation of northeast days placed 29545 downwind and 29543 upwind (Figure 35). Similar observations were observed as above, except the downwind effect on TSP and iron were greater possibly indicating a greater effect of the No. 1 melt shop, and the carbon downwind effect was less indicating a reduce effect of the coke ovens. The latter observation could indicate that coke ovens or coke quench emissions undergo high plume rise and travel in elevated plumes.

10.1.6 Dofasco Foundry - Figure 36

Days of southwest winds placed 29545 - Dofasco Quality Center downwind and 29531 - J.I. Case upwind. The latter station was chosen as it was free of industrial influences much like a station to the southwest of the foundry, had one existed. There were clear upwind/downwind differences observed, particularly for TSP, iron, and carbon. It should be noted that traffic on Burlington Street lay in between the downwind station and the foundry and could have contributed to the downwinds. This traffic contribution can be estimated through comparison to Figure 40's southwest results for station 29555 - Strathearn, about equal distance from Burlington Street as 29545. The downwind results for 29545 all exceed those of 29555, indicating a clear effect of the foundry, particularly for TSP, iron, and carbon.

10.1.7 Dofasco Blast Furnaces - Figure 37

Days of west winds placed 29543 - Dofasco Galvanizing downwind and both 29545 - Dofasco Quality Center and 29537 - Stelco East Filtration upwind. The latter station was chosen to be upwind of Dofasco, but downwind of Stelco, to gauge the latter's emissions entry to Dofasco.

As can be seen, the downwind averages at 29543 were very high in comparison to both upwinds, particularly for TSP, iron, and carbon. These downwind carbon averages were the highest of any data subset observed in this survey and indicate a major contribution from these stack sources. The

station's elevated location, 85 metres above ground, further emphasizes that stacks were indeed the prime contributors and it can be assumed that these emissions can travel some distance downwind.

10.1.8 Dofasco #2 Coke Plant/Heckett - Figures 38 and 39

West days placed Beach station 29547 downwind and 29537 - Stelco East Filtration upwind (Figure 38). For all parameters, the upwind site which was downwind of the main Stelco sources gave generally much higher averages than the downwind Beach monitor. It is unlikely that the subject Dofasco sources made any significant contribution to the Beach.

Northeast days placed 29537 - East Filtration downwind and 29541 - Dofasco Harbour upwind of the subject sources (Figure 39). Huge differences are apparent, in part because the upwind was measuring low background type air from off the harbour. The extremely high iron levels on the downwind side may indicate that Dofasco blast furnaces contributed to these measurements. The Stelco BOF is another possibility but the source required northwest winds to impinge. There are no apparent stationary sources of iron to the northeast of the Filtration plant. Similar to the Stelco Chem Lab site 29535 (Figure 31), it is likely that the Dofasco Heckett facility was the source.

10.1.9 Columbian Chemical - Figures 40 and 41

Days of southwest winds placed 29557 - Parkdale downwind and 29555 - Strathearn upwind. Free and total carbon showed a clear downwind contribution, but levels were lower than measured at other stations in the survey. The other parameters showed either small or non-existent differences (higher upwinds).

Days of northeast winds reversed the above two stations. In this case, Strathearn measured higher downwind average for all parameters. However, the magnitudes of the downwind carbon levels were less than in the southwest wind case above because Strathearn lies further from Columbian than Parkdale - Columbian's effect then during this survey was very localized and small.

10.2 Upwind/Downwind - Single Station/Different Days

10.2.1 29531 - J.I. Case - Stelco Blast Furnaces/Coke Plants - Figure 42

Days of northeast placed this station downwind and days of southwest upwind. Clear differences are observed for all parameters, although the actual downwind concentrations are not as elevated as at other locations.

10.2.2 29535 - Stelco Chem Lab - Stelco Blast Furnaces/Coke Plants - Figure 43

Days of west winds placed this station downwind and northeast upwind. Carbon levels were more elevated

on the downwind days but iron and carbonate were much higher on the upwind northeast days as previously noted by Figure 31. Stelco Heckett or the BOF are obvious local sources of iron to the northeast but the source of carbonate is not clear.

10.2.3 29533 - Stelco Crane Runway - BOF/Heckett - Figure 44

Days of southwest winds placed this station downwind and northeast upwind. Substantial differences are observed, partly because northeast winds were background air uninfluenced by any industrial source. The Stelco blast furnaces/coke plant area could have also contributed to the downwind effect.

10.2.4 29533 - Stelco Crane Runway - Stelco Coal Piles/Heckett - Figure 45

West winds placed this station downwind of the coal piles and the Heckett facility and northeast winds off the harbour upwind. A substantial difference was observed, particularly for TSP, iron, and carbonate, similar to Figure 32. The high iron differential again indicates that the Heckett facility was a major contributor. Carbon levels did show clear downwind effects. Both Heckett and the coal piles could contribute to these. The large carbonate effect was probably due to Heckett.

10.2.5 29541 - Dofasco Harbour - Coal Piles - Figure 46

West winds placed the station downwind and northeast winds upwind. Substantial downwind differences are apparent but this figure should be compared to Figure 33 in which upwind readings on west wind days were as high or higher than at station 29541. Stelco sources were likely major contributors. If carbonate can be used as an indicator of Heckett, that source's contribution to 29541 was small.

10.2.6 29545 - Dofasco Quality Center - Dofasco #1 Coke/Melt Shops - Figure 47

Days of northeast winds placed this station downwind and southwest upwind. Downwind effects are apparent but are not as significant as other comparisons. The greatest effect was for iron, indicating the melt shop's effect. This comparison is affected by the fact that the "upwind" days placed this station downwind of the Dofasco Foundry and Burlington Street. The results of Figure 47 are similar to those of Figures 34 and 35. The effects of the coke plant on this site may be muted due to plume rise phenomena. An upcoming section notes a greater effect on carbon levels at higher elevations downwind of the coke plant.

10.2.7 29543 - Dofasco Galvanizing - Dofasco Blast Furnaces - Figure 48

Days of west winds placed this station downwind and northeast winds upwind. Large downwind effects are observed similar to those shown previously by Figure 37. The carbon averages were extremely high. Stelco sources may have contributed somewhat, but the Dofasco blast furnaces were likely the prime sources, particularly for carbon.

10.2.8 29543 - Dofasco Galvanizing - Dofasco Melt Shops/Coke Plant - Figure 49

Southwest winds placed this station downwind and northeast upwind. A clear downwind effect is apparent for TSP, iron, and carbon, similar to Figure 34. Manganese and carbonate showed an effect. The effect on carbon was greater than observed at site 29545 - Quality Center suggesting that coke oven emissions undergo plume rise to high evaluations.

10.2.9 29547 - Beach - Dofasco #2 Coke Plant/Heckett - Figure 50

Days of west winds placed this station downwind and northeast winds upwind. The figure can be viewed together with Figure 38 - a similar comparison. Downwind effects are apparent in Figure 50, but as shown by Figure 38, they cannot be ascribed to the subject sources. An attempt will be made in an upcoming section to apportion sources affecting the Beach site.

10.2.10 29555 Strathearn and 29557 - Parkdale - Columbian Chemical - Figures 51 & 52

Station 29555 was downwind on northeast days and upwind on southwest. Figure 52 shows virtually no downwind effect by the subject source. This figure can be compared to Figure 41 which suggested a small contribution from Columbian. But Figure 52 suggests the latter's contribution at this site during this survey was about equivalent to emissions from Burlington Street.

Station 29557 - Parkdale was downwind on southwest days and upwind on northeast. Figure 51 shows a clear downwind effect, particularly for carbon. The results are similar to those shown previously by Figure 40 except the differences are greater because the upwind case is less affected by other sources, namely Burlington Street.

11. Sources of Elevated Particulate Concentrations at 29547 - Beach

As noted previously, suspended particulate concentrations at Beach station 29547 correlated best with westerly winds. An attempt was made to determine the sources most affecting this monitor by comparing its days of higher concentrations to those of five stations in the immediate forefront of this general wind direction.

Data in Table 19 isolates eight dates when TSP levels reached or exceeded 100 ug/m^3 at station 29547. The data from five industry station are presented along side. These stations are:

29533 - Stelco Crane Runway
29535 - Stelco Chem Lab
29537 - Stelco East Filtration
29541 - Dofasco Harbour
29543 - Dofasco Galvanizing

The co-variation of 29547 TSP, iron, manganese, and carbon with the same parameters for their five stations are illustrated in Figures 53-57. The degree of co-variation is determined by the linear correlation coefficient in Table 20.

From the table it is clear that the Beach elevated concentrations correlated powerfully with those of station 29543 - Dofasco Galvanizing, with "r"s greater than 0.9. The next best correlations were for 29533 - Stelco Crane Runway, but these "r"s were also powerful in the 0.6-0.7 range.

Thus, it may be argued that as Dofasco sources were the main contributor at 29543, they may also be a significant contributor to the Beach locations. Further, since 29543 was

clearly affected mainly by point sources due to its high elevation, the Beach site is likewise. This is partial confirmation of past studies which have suggested that point sources rather than fugitive ones affect the Beach the most.

12. Summary and Conclusions

A) This survey noted lower than normal particulate concentrations. Concentrations of suspended particulates and dustfall at routine network stations troughed during the survey only, to only give rise again post-survey. During the survey itself, suspended particulate concentrations improved progressively over time. It is unlikely that weather phenomena could account for the change.

B) Analysis of the particulate samples indicated the prime constituents of the dust were iron, manganese, and carbon. Metals such as lead, cadmium, nickel, and chromium were at background levels, confirming routine network monitoring.

C) The dustfall, TSP, and metals objectives were exceeded most often in the central areas of the steel mills. Few exceedences were measured off-property or at fringe stations. The latter observation was atypical of routine observations.

D) There was no statistical difference between day and night TSP samples at all locations in the industrial zone.

E) Rainfall had the effect of reducing suspended particulate levels by about 30-36% on average. This effect was caused both by plume washout and by a lessening of fugitive ground level dust re-entrainment.

F) Wind correlations and upwind/downwind analyses indicated the following to be significant sources of particulate:

Stelco BOF, blast furnace/coke oven area, Heckett, coal piles

Dofasco melt shops, #1 coke plant, blast furnaces, foundry

Of these sources, due to their position and the nature of their emissions (fugitive), the Stelco Heckett and coal piles had the least off-property effects except for their likely contribution to loadings into Hamilton Harbour.

The Dofasco coal pile area did not appear to be a significant source during the survey but the potential to be one is ever present if mitigative control actions are not maintained.

Columbian Chemical was a minor source of carbon particulate during survey. Its effect was small and localized. Since the survey, this company may have had an increase in this effect as evidenced by frequent visible releases.

G) Stack emissions appeared to be prime contributors to many of the measurements. Concentrations at an elevated station, remote from ground level fugitive dust were as high or higher than most of the other data and yielded some of the highest concentrations.

H) The higher concentrations measured at the Beach Pier 25 station correlated very strongly with the Dofasco Galvanizing station - the elevated locations mentioned above. This suggests and confirms that point sources, possibly Dofasco's, are prime contributors at the Beach.

This survey was a rough indicator of particulate source identification in the industrial zone. It should be stressed that this is not a be-all end-all, definitive study. Further studies offering greater precision are currently under way or being planned.

TABLE 1

STATION DETAILS - HAMILTON INDUSTRY PARTICULATE SURVEY

STATION	NAME	HEIGHT(ft)	HIVOL	DUSTFALL	REMARKS
29531	J.I.CASE PLANT	25	X	X	
	STELCO SITES				
29533	CRANE 56 RUNWAY	40	X	X	Fugitive dust nearby
29535	CHEM LAB	30	X	X	
29537	EAST SIDE FILTR-ATION PLANT	25	X	X	
29539	GENERAL OFFICE	55	X	X	
	DOFASCO SITES				
29541	HARBOUR SHORE TOWER	20	X	X	Coal,ore piles, traffic nearby
29543	#4 GALVANIZING LINE	75	X	X	
29545	QUALITY CENTER	25	X	X	
	EAST END SITES				
29547	BEACH STRIP PIER 25	12	X	X	
29555	STRATHEARN - DOFASCO NO.8 PLANT STORES	20	X		
29557	PHILIPS ROD MILL	25	X		

TABLE 2a

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe2O3) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	ug/m3 29531 J.J. Case Plant TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	34	0.14	0.00	0.00	2.3	0.11	0.000	0.02	0.00	1.8	7.8	0.3
	29	0	0	3	1	3	0	0	0	5	0	5	43	0.13	0.00	0.04	2.2	0.07	0.001	0.01	0.00	2.9	7.7	0.0
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	53	0.54	0.00	0.00	0.8	0.12	0.000	0.02	0.00	1.9	10.5	0.8
	4	0	0	0	0	0	0	8	4	0	0	10	27	0.32	0.00	0.00	0.7	0.16	0.000	0.02	0.00	1.2	6.3	0.0
N	7	0	0	2	0	0	0	0	0	10	0	1	94	0.29	0.00	0.07	13.6	0.36	0.000	0.02	0.00	10.9	20.2	0.2
	10	0	0	0	0	0	0	8	4	0	0	11												
N	13	0	0	0	0	0	0	0	0	12	0	1												
	16	0	0	0	0	4	8	0	0	0	5	18												
N	19	0	0	0	0	6	6	0	0	0	1	14												
	22	0	0	0	0	0	11	1	0	0	0	12	75	0.13	0.00	0.04	2.4	0.28	0.000	0.02	0.02	2.8	12.3	0.7
N	25	0	3	1	0	3	3	0	0	2	0	8	89	0.25	0.00	0.05	3.4	0.39	0.000	0.03	0.02	4.0	11.6	0.0
	28	0	0	0	0	0	2	10	0	0	0	10	101	0.18	0.00	0.05	2.9	0.36	0.000	0.07	0.00	2.3	13.4	1.0
N	31	6	6	0	0	0	0	0	0	0	5	18	77	0.13	0.01	0.03	5.3	0.27	0.000	0.02	0.00	3.5	10.0	0.5
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	40	0.19	0.00	0.01	0.9	0.10	0.000	0.00	0.00	1.2	5.9	0.0
	6	0	1	8	0	0	0	0	0	3	0	8	115	0.34	0.02	0.05	11.5	1.22	0.000	0.08	0.00	3.8	12.3	1.4
N	9	0	0	0	0	2	8	0	0	2	0	6	76	0.23	0.00	0.02	2.2	0.34	0.000	0.03	0.00	2.2	8.9	0.0
	12	1	2	6	0	0	0	0	2	1	0	9	146	0.22	0.01	0.10	12.4	0.72	0.000	0.06	0.03	7.4	23.3	1.9
N	15	0	0	0	0	0	6	3	0	3	0	7	65	0.22	0.00	0.02	2.6	0.10	0.000	0.02	0.04	1.1	10.0	0.0
	18	0	0	0	0	0	9	0	0	3	0	9	123	0.15	0.00	0.06	5.1	0.94	0.000	0.06	0.02	3.6	16.8	1.7
N	21	0	0	0	0	3	3	0	0	6	0	4	40	0.35	0.00	0.02	0.8	0.16	0.000	0.00	0.04	2.1	10.4	0.0
	24	0	8	0	0	0	0	0	0	4	0	6	122	0.16	0.01	0.21	8.3	1.48	0.000	0.04	0.02	12.1	25.0	1.8
N	27	0	0	0	0	0	1	9	2	0	0	8	24	0.23	0.00	0.02	0.9	0.09	0.000	0.05	0.00	0.7	4.6	0.0
N	30	0	2	0	0	0	5	2	1	2	3	10	131	0.26	0.00	0.21	9.6	0.68	0.000	0.05	0.03	6.3	17.4	1.0
N	OCT 3	0	0	0	0	0	0	2	1	9	0	1	66	0.19	0.00	0.05	2.3	0.14	0.000	0.02	0.00	5.0	12.2	0.1
	6	0	0	0	0	2	8	2	0	0	3	14	22	0.09	0.00	0.01	0.7	0.07	0.000	0.01	0.00	1.6	4.8	0.0
N	9	2	0	1	0	2	4	0	1	2	0	5	85	0.17	0.00	0.03	2.3	0.65	0.000	0.00	0.00	4.3	13.9	0.4
	12	0	0	5	0	0	1	2	0	4	0	5	36	0.24	0.01	0.00	0.5	0.07	0.000	0.00	0.00	2.6	7.4	0.0
N	15	0	0	0	0	0	3	9	0	0	0	9	23	0.19	0.00	0.00	1.9	0.05	0.000	0.01	0.00	1.1	4.8	1.2
	18	0	0	0	0	0	4	8	0	0	0	11	44	0.03	0.00	0.01	1.0	0.36	0.000	0.00	0.01	1.3	6.4	0.8
N	21	0	0	0	0	0	10	0	0	2	0	9	27	0.06	0.00	0.01	0.9	0.24	0.000	0.00	0.01	0.8	3.8	0.0
	24	0	0	0	0	5	7	0	0	0	0	13	34	0.06	0.00	0.01	1.6	0.08	0.000	0.00	0.01	0.7	4.2	0.1
N	27	4	8	0	0	0	0	0	0	0	0	16	38	0.04	0.00	0.01	3.7	0.13	0.000	0.00	0.00	5.9	8.9	0.0
	30	0	10	2	0	0	0	0	0	0	0	10	67	0.05	0.00	0.09	10.5	0.25	0.000	0.01	0.00	4.6	8.2	0.3
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	15	0.08	0.00	0.00	0.4	0.03	0.000	0.00	0.00	0.8	1.9	0.0
	5	0	0	0	0	4	3	1	0	4	0	5	28	0.09	0.00	0.03	0.7	0.10	0.000	0.01	0.00	1.3	4.3	0.0
N	8	1	0	0	0	0	0	1	1	9	0	1	29	0.06	0.00	0.00	1.0	0.29	0.000	0.00	0.00	2.5	5.6	0.1
N	12	0	0	0	0	0	9	3	0	0	0	11	14	0.06	0.00	0.00	0.2	0.03	0.000	0.01	0.00	1.0	2.4	0.0
	14	0	0	3	0	0	3	0	0	6	0	4	66	0.08	0.00	0.03	7.9	0.59	0.001	0.02	0.00	4.1	8.3	0.3
	17	1	0	8	0	0	0	0	1	2	0	7	20	0.07	0.00	0.04	1.9	0.12	0.000	0.00	0.00	1.7	4.4	0.0
	20	0	0	0	0	2	5	2	3	0	4	15												
													35	35	35	35	35	35	35	35	35	35	35	35 n
													49	0.14	0.01	0.02	2.1	0.18	0.001	0.01	0.01	2.4	8.1	0.2 Geo Mean
													146	0.54	0.02	0.21	13.6	1.48	0.001	0.08	0.04	12.1	25	1.9 Max

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe2O3) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

ug/m3 29547 Beach Strip Pier 25 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
53	0.53	0.03	0.08	2.8	0.15	0.000	0.01	0.04	3.7	9.0	0.1
41	0.36	0.00	0.00	1.1	0.05	0.000	0.00	0.00	2.0	6.7	0.0
129	0.20	0.00	0.07	8.5	0.33	0.000	0.03	0.03	10.9	22.4	0.4
36	0.48	0.00	0.02	1.4	0.10	0.000	0.00	0.00	1.8	6.5	0.0
39	0.83	0.00	0.00	0.7	0.07	0.000	0.00	0.00	2.6	6.2	0.1
95	0.48	0.03	0.05	15.6	0.28	0.000	0.03	0.01	5.0	12.5	0.5
175	0.65	0.00	0.15	19.8	0.75	0.001	0.07	0.00	15.3	31.6	2.2
120	0.26	0.00	0.11	8.0	0.37	0.000	0.02	0.00	6.6	16.8	0.4
30	0.30	0.00	0.00	0.5	0.03	0.000	0.00	0.00	1.6	3.8	0.0
100	0.21	0.00	0.13	4.5	0.33	0.000	0.02	0.00	2.3	12.3	0.5
106	0.52	0.00	0.08	2.0	0.16	0.000	0.00	0.00	1.2	8.1	0.0
162	0.20	0.00	0.11	10.0	0.59	0.000	0.09	0.03	6.2	19.4	0.7
73	0.30	0.00	0.01	1.6	0.16	0.000	0.00	0.00	1.9	4.2	0.4
78	0.21	0.00	0.37	4.9	0.28	0.000	0.00	0.00	5.4	10.4	0.0
119	0.48	0.00	0.01	1.9	0.22	0.000	0.00	0.00	3.7	9.1	0.2
87	0.17	0.00	0.08	2.9	0.19	0.000	0.00	0.00	4.5	9.5	0.0
53	0.51	0.00	0.04	1.2	0.08	0.000	0.00	0.00	2.1	6.4	0.1
83	0.30	0.00	0.10	3.9	0.17	0.002	0.01	0.00	4.8	12.4	0.0
36	0.33	0.00	0.06	1.3	0.11	0.000	0.00	0.00	3.5	7.9	0.0
79	0.26	0.00	0.01	2.8	0.23	0.000	0.01	0.00	3.0	7.0	0.0
91	0.24	0.00	0.12	7.7	0.35	0.000	0.00	0.00	9.2	16.3	0.0
86	0.24	0.00	0.19	3.8	0.17	0.000	0.00	0.00	4.0	10.7	0.2
52	0.30	0.00	0.02	1.4	0.08	0.000	0.00	0.00	3.9	9.2	0.0
50	0.12	0.00	0.03	2.8	0.19	0.000	0.00	0.00	5.0	9.6	0.1
84	0.40	0.00	0.06	3.1	0.25	0.000	0.00	0.00	7.5	13.2	0.0
71	0.34	0.00	0.10	3.5	0.30	0.000	0.00	0.00	5.0	15.4	0.0
101	0.10	0.00	0.20	8.0	0.54	0.000	0.01	0.02	9.6	15.6	0.0
50	0.06	0.00	0.03	2.4	0.17	0.000	0.00	0.00	4.4	7.1	0.4
52	0.06	0.00	0.07	3.3	0.13	0.003	0.00	0.00	5.8	7.3	0.0
47	0.07	0.00	0.02	1.5	0.09	0.002	0.00	0.00	3.2	5.5	0.2
5	0.06	0.00	0.00	0.1	0.00	0.000	0.00	0.00	0.3	1.0	0.0
34	0.03	0.00	0.00	2.4	0.09	0.000	0.00	0.01	3.7	4.6	0.0
17	0.07	0.00	0.02	0.2	0.02	0.000	0.00	0.00	1.8	3.3	0.0
35	0.02	0.00	0.02	8.2	0.07	0.000	0.00	0.02	4.5	6.9	0.0
38	0.06	0.00	0.02	0.9	0.04	0.000	0.00	0.00	1.6	4.2	0.0
7	0.06	0.00	0.00	0.0	0.01	0.000	0.00	0.00	0.6	1.2	0.0
36	36	36	36	36	36	36	36	36	36	36	36
57	0.20	0.01	0.04	2.1	0.13	0.001	0.01	0.00	3.4	8.0	0.1
175	0.83	0.03	0.37	19.8	0.75	0.003	0.09	0.04	15.3	31.6	2.2

TABLE 2b

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe2O3) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe2O3) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	ug/m3 29533 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3		ug/m3 29535 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
													Stelco - Crane 56 Runway													Stelco - Chem Lab											
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	120	0.03	0.00	0.00	4.2	0.60	0.000	0.03	0.00	4.9	10.2	1.2		170	0.12	0.01	0.11	16.9	0.63	0.000	0.05	0.00	30.3	42.5	2.3
	29	0	0	3	1	3	0	0	0	5	0	5	75	0.19	0.01	2.32	9.8	0.29	0.001	0.03	0.00	4.3	8.8	0.0		29	0.11	0.01	0.17	14.1	0.18	0.000	0.03	0.00	2.4	8.5	0.0
N	AUG 1	0	0	0	0	0	0	4	8	0	0	10	312	0.05	0.02	0.08	29.4	2.22	0.000	0.11	0.05	30.9	52.0	4.0		130	0.05	0.00	0.08	6.3	0.35	0.000	0.04	0.00	15.8	34.4	1.3
	4	0	0	0	0	0	0	8	4	0	0	10	164	0.02	0.00	0.00	9.5	1.44	0.000	0.04	0.01	5.5	10.7	0.7		147	0.06	0.00	0.24	21.1	0.73	0.000	0.05	0.00	19.9	32.2	1.2
N	7	0	0	2	0	0	0	0	0	10	0	1	39	0.10	0.00	0.01	1.0	0.13	0.000	0.00	0.00	1.6	5.4	0.0		139	0.08	0.18	0.19	16.4	0.73	0.000	0.05	0.00	9.7	19.5	2.3
	10	0	0	0	0	0	0	8	4	0	0	11	185	0.03	0.00	0.02	7.7	0.98	0.000	0.03	0.00	7.6	15.3	1.5		288	0.07	0.09	0.18	38.8	1.44	0.000	0.08	0.00	29.7	41.8	3.7
N	13	0	0	0	0	0	0	0	0	12	0	1	303	0.04	0.00	0.08	25.2	1.80	0.000	0.07	0.00	18.4	31.3	3.8		220	0.05	0.06	0.07	14.3	0.50	0.000	0.02	0.00	40.0	63.3	2.4
	16	0	0	0	0	4	8	0	0	0	5	18	367	0.05	0.00	0.24	24.3	2.50	0.001	0.08	0.00	16.6	32.6	3.7		212	0.07	0.05	0.21	22.3	0.93	0.001	0.11	0.00	17.3	34.4	1.6
N	19	0	0	0	0	6	6	0	0	1	14	19	0.13	0.00	0.01	0.4	0.05	0.000	0.00	0.02	0.4	3.7	0.0		107	0.11	0.00	1.09	13.1	0.47	0.000	0.02	0.02	4.2	10.7	1.4
	22	0	0	0	0	11	1	0	0	0	12	205	0.12	0.00	0.22	13.4	1.13	0.002	0.05	0.02	5.2	19.9	3.3		182	0.14	0.00	0.30	16.8	0.75	0.000	0.05	0.01	6.7	23.6	3.0
N	25	0	3	1	0	3	3	0	0	2	0	8	130	0.13	0.00	0.13	3.8	0.55	0.000	0.03	0.04	4.6	11.1	0.2		148	0.06	0.00	0.22	6.1	0.54	0.000	0.04	0.02	6.9	16.5	0.8
	28	0	0	0	0	0	2	10	0	0	0	10	327	0.05	0.00	0.07	21.6	2.62	0.000	0.12	0.07	17.0	27.3	2.9		231	0.07	0.00	0.12	21.5	1.25	0.000	0.50	0.04	13.4	28.0	0.6
N	31	6	6	0	0	0	0	0	0	0	5	18	65	0.06	0.00	0.01	3.8	0.31	0.000	0.00	0.02	1.7	6.4	0.2		212	0.09	0.00	0.20	18.2	1.29	0.000	0.08	0.02	4.8	12.9	3.9
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	232	0.09	0.00	0.44	16.3	2.13	0.000	0.07	0.04	8.9	17.2	1.6		143	0.05	0.00	0.24	13.1	0.51	0.000	0.03	0.01	8.9	22.5	0.9
	6	0	1	8	0	0	0	0	0	3	0	8	149	0.14	0.00	0.04	6.7	0.79	0.000	0.03	0.01	6.5	11.1	0.8		295	0.08	0.00	0.34	23.8	1.67	0.000	0.06	0.05	17.3	38.8	5.4
N	9	0	0	0	0	2	8	0	0	2	0	6	223	0.16	0.01	0.33	12.9	0.72	0.000	0.04	0.03	7.3	15.9	1.3		148	0.05	0.00	0.07	13.0	0.49	0.000	0.04	0.02	4.4	12.2	0.9
	12	1	2	6	0	0	0	0	2	1	0	9	53	0.12	0.00	0.03	2.0	0.15	0.000	0.00	0.02	2.5	7.2	0.3		203	0.10	0.01	0.11	20.6	0.84	0.000	0.04	0.10	8.3	21.1	3.8
N	15	0	0	0	0	0	6	3	0	3	0	7	136	0.10	0.00	0.08	8.9	0.83	0.001	0.03	0.02	8.7	15.8	0.2		111	0.05	0.00	0.08	6.3	0.36	0.000	0.02	0.02	5.8	14.8	0.4
	18	0	0	0	0	0	9	0	0	3	0	9	261	0.09	0.00	0.07	19.4	1.48	0.000	0.05	0.04	11.5	22.8	4.4		242	0.08	0.01	0.20	25.4	0.95	0.001	0.08	0.03	11.3	25.8	5.3
N	21	0	0	0	0	3	3	0	0	6	0	4	163	0.09	0.01	0.05	13.8	1.10	0.000	0.03	0.06	5.3	11.6	0.8		144	0.05	0.00	0.08	13.6	0.57	0.000	0.03	0.01	13.2	24.1	2.6
	24	0	8	0	0	0	0	0	0	4	0	6	94	0.17	0.00	0.01	4.4	0.56	0.000	0.03	0.03	3.6	7.5	1.5		171	0.11	0.00	0.54	13.8	1.27	0.000	0.05	0.00	9.8	19.0	3.6
N	27	0	0	0	0	0	1	9	2	0	0	8	125	0.05	0.00	0.05	11.8	1.37	0.000	0.06	0.01	4.4	8.5	0.6		89	0.11	0.00	0.13	6.1	0.59	0.000	0.02	0.02	8.6	16.2	0.5
N	30	0	2	0	0	0	5	2	1	2	3	10	214	0.12	0.00	0.24	13.9	1.38	0.000	0.06	0.05	6.3	14.7	2.0		198	0.11	0.00	0.25	16.9	0.69	0.000	0.07	0.06	11.0	23.2	2.1
N	OCT 3	0	0	0	0	0	0	2	1	9	0	1	116	0.10	0.00	0.03	5.9	0.60	0.000	0.02	0.01	7.6	12.9	0.0		127	0.10	0.00	0.06	6.9	0.47	0.000	0.04	0.04	13.4	24.7	0.9
	6	0	0	0	0	2	8	2	0	0	3	14	170	0.09	0.02	0.19	13.8	2.01	0.002	0.04	0.00	10.6	19.6	1.0		70	0.04	0.00	0.12	4.6	0.45	0.000	0.02	0.00	6.8	11.7	0.0
N	9	2	0	1	0	2	4	0	1	2	0	5	182	0.18	0.00	0.07	10.8	1.21	0.000	0.03	0.01	7.2	15.6	0.0		188	0.11	0.00	0.09	14.0	0.81	0.000	0.02	0.00	13.8	28.8	1.4
	12	0	0	5	0	0	1	2	0	4	0	5	84	0.19	0.00	0.03	2.1	0.56	0.000	0.03	0.00	2.7	8.7	0.0		88	0.10	0.02	0.06	5.1	0.38	0.000	0.03	0.00	10.5	19.0	0.0
N	15	0	0	0	0	3	9	0	0	0	0	9	162	0.06	0.00	0.25	17.7	1.52	0.000	0.06	0.02	14.4	20.8	0.5		74	0.11	0.01	0.05	3.3	1.31	0.000	0.01	0.00	13.1	21.5	0.1
	18	0	0	0	0	4	8	0	0	0	0	11	160	0.04	0.00	0.10	20.2	1.60	0.000	0.05	0.06	7.2	12.6	1.9		133	0.06	0.01	0.13	12.0	0.79	0.001	0.03	0.03	10.2	21.1	3.1
N	21	0	0	0	0	0	10	0	0	2	0	9	109	0.05	0.00	0.12	9.4	0.64	0.001	0.02	0.02	6.6	12.0	1.4		61	0.03	0.00	0.04	4.3	0.22	0.001	0.00	0.01	5.6	10.7	0.6
	24	0	0	0	0	5	7	0	0	0	0	13	71	0.04	0.00	0.04	9.1	0.40	0.001	0.02	0.02	2.8	7.2	1.2		80	0.03	0.00	0.18	8.6	0.33	0.000	0.02	0.02	4.0	3.1	1.3
N	27	4	8	0	0	0	0	0	0	0	0	16	12	0.06	0.00	0.00	0.8	0.07	0.000	0.00	0.00	0.3	0.8	0.0		42	0.03	0.00	0.03	3.0	0.31	0.001	0.00	0.02	1.7	2.8	0.8
	30	0	10	2	0	0	0	0	0	0	0	10	15	0.06	0.00	0.00	0.4	0.03	0.000	0.01	0.00	0.4	1.8	0.0		16	0.05	0.00	0.06	9.0	0.28	0.002	0.02	0.00	4.7	6.6	2.4
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	120	0.06	0.00	0.23	23.7	0.04	0.002	0.06	0.02	5.1	7.6	0.8		44	0.04	0.01	0.03	2.2	0.10	0.000	0.01	0.01	0.7	2.9	0.0
	5	0	0	0	4	3	1	0	4	0	5	124	0.07	0.00	0.07	12.7	0.78	0.002	0.04	0.01	5.5	9.7	1.7		94	0.04	0.00	0.19	13.0	0.62	0.002	0.03	0.00	4.3	10.7	1.7
N	8	1	0	0	0	0	0	1	1	9	0	1	49	0.04	0.00	0.00	1.3	0.16	0.001	0.02	0.00	5.1	8.4	0.1		99	0.03	0.01	0.04	10.9	0.43	0.000	0.02	0.00	9.1	16.4	1.9
N	12	0	0	0	0	0	9	3	0	0	0	11	99	0.02	0.00	0.10	12.9	0.85	0.002	0.03	0.01	5.8	8.2	0.3		27	0.03	0.00	0.00	1.4	0.05	0.000	0.00	0.00	1.1	2.3	0.0
	14	0	0	3	0	0	3	0	0	6	0	4	77	0.04	0.00	0.02	8.2	0.33	0.002	0.02	0.00	5.1	6.9	0.3		92	0.05	0.02	0.04	8.8	0.28	0.001	0.01	0.00	6.4	11.0	1.1
	17	1	0	8	0	0	0	0	1	2	0	7	18	0.03	0.00	0.00	0.6	0.07	0.000	0.00	0.00	0.9	1.8	0.0		70	0.04	0.00	0.23	8.0	0.26	0.000	0.02	0.00	4.9	8.9	1.3
	20	0	0	0	0	2	5	2	3	0	4	15	32	0.03	0.00	0.00	1.4	0.19	0.001	0.01	0.00	1.0	2.2	0.0		18	0.03	0.00	0.02	6.0	0.16	0.000	0.01	0.00	2.5	3.5	0.1
													40	40	40	40	40	40	40	40	40	40	40	40	n	40	40	40	40	40	40	40	40	40	40	40	40
													105	0.07	0.01	0.05	6.1	0.55	0.001	0.03	0.01	4.6	9.9	0.4	Geo Mean	108	0.06	0.01	0.11	10.1	0.50	0.001	0.03	0.00	7.6	15.8	0.9
													367	0.19	0.02	2.32	29.4	2.62	0.002	0.12	0.07	30.9	52.0	4.4	Max	295	0.14	0.18	1.09	38.8	1.67	0.002	0.5	0.1	40	63.3	5.43

TABLE 2c

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe2O3) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

1991 DATE		HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	ug/m3 29537 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	167	0.08	0.00	0.19	22.7	0.78	0.001	0.08	0.00	14.8	30.4	2.1
	29	0	0	3	1	3	0	0	0	5	0	5	79	0.08	0.02	0.10	13.4	0.26	0.001	0.03	0.00	4.8	11.8	0.0
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	123	0.09	0.01	0.05	12.2	0.36	0.000	0.04	0.00	8.5	22.4	2.1
	4	0	0	0	0	0	0	8	4	0	0	10	132	0.08	0.01	0.92	14.9	0.57	0.000	0.03	0.00	9.0	20.4	1.1
N	7	0	0	2	0	0	0	0	0	10	0	1	145	0.04	0.05	0.11	21.2	0.53	0.000	0.06	0.00	8.0	13.0	3.4
	10	0	0	0	0	0	0	8	4	0	0	11	206	0.10	0.04	0.16	25.3	0.83	0.001	0.05	0.00	16.9	28.0	2.9
N	13	0	0	0	0	0	0	0	0	12	0	1	243	0.09	0.02	0.11	22.0	0.88	0.000	0.05	0.00	34.8	52.2	3.4
	16	0	0	0	0	4	8	0	0	0	5	18	183	0.10	0.02	0.09	19.6	0.76	0.001	0.04	0.00	11.2	24.3	2.0
N	19	0	0	0	0	6	6	0	0	1	0	14	126	0.04	0.04	0.37	28.8	0.43	0.000	0.08	0.01	8.2	16.9	0.8
	22	0	0	0	0	0	11	1	0	0	0	12	160	0.08	0.01	0.12	9.7	0.58	0.000	0.04	0.03	10.0	19.2	2.8
N	25	0	3	1	0	3	3	0	0	2	0	8	173	0.09	0.00	0.10	12.6	0.46	0.000	0.04	0.03	8.2	22.1	1.4
	28	0	0	0	0	0	2	10	0	0	0	10	225	0.09	0.00	0.10	17.8	0.96	0.000	0.19	0.03	3.8	24.9	3.3
N	31	6	6	0	0	0	0	0	0	0	5	18	168	0.04	0.01	1.42	20.0	0.36	0.000	0.03	0.00	9.0	22.5	3.4
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	120	0.08	0.00	0.17	11.8	0.39	0.000	0.03	0.04	5.9	15.2	0.7
	6	0	1	8	0	0	0	0	0	3	0	8	278	0.10	0.02	0.21	26.7	1.07	0.000	0.06	0.04	13.2	34.5	5.9
N	9	0	0	0	0	2	8	0	0	2	0	6	127	0.05	0.00	0.02	8.0	0.41	0.000	0.02	0.01	3.8	11.9	1.0
	12	1	2	6	0	0	0	0	2	1	0	9	177	0.05	0.00	0.13	16.4	0.58	0.000	0.03	0.00	17.8	34.4	2.7
N	15	0	0	3	0	0	6	3	0	3	0	7	107	0.07	0.00	0.06	8.5	0.36	0.000	0.02	0.02	5.7	15.0	0.5
	18	0	0	0	0	0	9	0	0	3	0	9	132	0.07	0.01	0.06	12.8	0.97	0.000	0.05	0.03	6.1	21.1	4.7
N	21	0	0	0	0	3	3	0	0	6	0	4	137	0.07	0.00	0.07	17.2	0.54	0.000	0.02	0.03	10.1	20.5	2.5
	24	0	8	0	0	0	0	0	0	4	0	6	169	0.07	0.04	0.85	32.9	0.77	0.000	0.07	0.02	9.0	19.9	2.9
N	27	0	0	0	0	0	1	9	2	0	0	8	82	0.04	0.00	0.08	6.6	0.34	0.000	0.03	0.00	6.0	12.3	0.8
N	30	0	2	0	0	0	5	2	1	2	3	10	155	0.05	0.00	0.14	10.8	0.53	0.000	0.04	0.02	7.1	18.6	2.1
N	OCT 3	0	0	0	0	0	0	2	1	9	0	1	132	0.06	0.00	0.12	13.5	0.47	0.000	0.04	0.03	12.6	21.6	0.5
	6	0	0	0	0	2	8	2	0	0	3	14	68	0.04	0.01	0.00	2.1	0.24	0.000	0.00	0.00	2.5	7.2	0.0
N	9	2	0	1	0	2	4	0	1	2	0	5	147	0.07	0.00	0.07	10.9	0.60	0.000	0.02	0.00	9.4	22.2	1.1
	12	0	0	5	0	0	1	2	0	4	0	5	109	0.06	0.00	0.09	9.8	0.46	0.000	0.00	0.00	9.6	17.2	0.2
N	15	0	0	0	0	0	3	9	0	0	0	9	83	0.07	0.02	0.03	12.9	0.32	0.000	0.02	0.03	6.2	10.9	0.3
	18	0	0	0	0	0	4	8	0	0	0	11	97	0.04	0.00	0.11	13.3	0.46	0.001	0.02	0.03	5.3	10.4	1.4
N	21	0	0	0	0	0	10	0	0	2	0	9	59	0.03	0.00	0.07	5.6	0.29	0.002	0.02	0.02	2.9	7.8	0.6
	24	0	0	0	0	5	7	0	0	0	0	13	75	0.04	0.00	0.02	6.1	0.44	0.000	0.02	0.02	2.2	8.3	2.1
N	27	4	8	0	0	0	0	0	0	0	0	16	37	0.03	0.02	0.04	7.9	0.12	0.001	0.00	0.00	2.2	5.0	0.0
	30	0	10	2	0	0	0	0	0	0	0	10	100	0.06	0.02	0.03	20.9	0.20	0.000	0.02	0.00	8.0	8.2	0.9
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	29	0.04	0.00	0.01	2.2	0.07	0.000	0.00	0.00	2.4	4.0	0.0
	5	0	0	0	0	4	3	1	0	4	0	5	60	0.04	0.00	0.04	3.4	0.26	0.000	0.02	0.00	4.5	7.6	1.0
N	8	1	0	0	0	0	0	1	1	9	0	1	134	0.06	0.01	0.13	15.7	0.48	0.000	0.03	0.01	11.1	19.5	1.9
N	12	0	0	0	0	0	9	3	0	0	0	11												
	14	0	0	3	0	0	3	0	0	6	0	4												
	17	1	0	8	0	0	0	0	1	2	0	7												
	20	0	0	0	0	2	5	2	3	0	4	15												
													36	36	36	36	36	36	36	36	36	36	36	36	n
													120	0.06	0.01	0.09	12.1	0.44	0.001	0.03	0.01	7.3	15.9	1.0	Geo Mean
													278	0.1	-0.05	1.42	32.9	1.07	0.002	0.19	0.04	34.8	52.2	5.9	Max

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe2O3) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

ug/m3 29539 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
83	0.12	0.01	0.02	3.7	0.17	0.000	0.03	0.00	10.4	17.2	0.6
56	0.16	0.00	0.07	4.7	0.10	0.000	0.03	0.00	3.6	8.1	0.0
78	0.13	0.00	0.02	2.5	0.17	0.000	0.05	0.00	6.0	10.6	0.8
79	0.10	0.00	0.09	3.3	0.17	0.000	0.00	0.00	13.6	19.8	1.5
121	0.14	0.02	0.24	14.2	0.47	0.000	0.02	0.01	10.3	21.4	0.5
143	0.12	0.01	0.06	15.9	0.41	0.000	0.04	0.00	12.6	24.5	1.1
155	0.08	0.00	0.03	3.8	0.21	0.000	0.00	0.00	6.2	18.6	1.9
157	0.12	0.02	0.03	8.6	0.32	0.000	0.05	0.01	4.3	18.1	1.6
77	0.11	0.00	0.46	11.8	0.20	0.000	0.02	0.02	3.8	8.0	0.2
144	0.10	0.00	0.15	5.4	0.38	0.000	0.03	0.00	4.3	16.2	2.6
122	0.11	0.00	0.18	4.7	0.30	0.000	0.03	0.00	6.6	13.4	0.0
163	0.06	0.00	0.23	12.0	0.57	0.000	0.01	0.00	4.0	14.8	1.9
129	0.12	0.00	0.10	7.9	0.41	0.000	0.03	0.00	5.9	14.1	2.1
106	0.13	0.00	0.05	2.0	0.12	0.000	0.01	0.00	4.7	10.0	0.0
195	0.12	0.00	0.12	8.8	0.55	0.000	0.03	0.01	10.4	20.6	2.4
120	0.11	0.00	0.07	4.2	0.28	0.002	0.03	0.00	3.6	11.3	0.3
158	0.13	0.00	0.11	11.8	0.70	0.000	0.04	0.01	11.3	18.1	2.1
100	0.09	0.00	0.05	3.1	0.15	0.000	0.01	0.04	2.0	10.1	0.0
170	0.09	0.01	0.13	8.5	0.47	0.001	0.05	0.03	3.5	16.7	2.8
57	0.09	0.00	0.03	2.9	0.13	0.000	0.02	0.00	4.5	9.7	0.2
119	0.10	0.00	0.37	8.9	1.58	0.000	0.03	0.03	5.0	13.6	1.6
102	0.10	0.00	0.03	2.3	0.23	0.000	0.03	0.01	2.2	6.1	0.0
188	0.17	0.00	0.44	8.9	0.57	0.000	0.05	0.03	8.4	18.1	1.9
104	0.10	0.00	0.04	3.9	0.21	0.000	0.00	0.04	5.9	12.0	0.3
44	0.06	0.00	0.03	1.3	0.12	0.000	0.00	0.01	1.3	4.9	0.0
129	0.13	0.00	0.05	4.3	0.65	0.000	0.02	0.00	7.0	19.5	0.9
51	0.11	0.00	0.02	0.9	0.08	0.000	0.00	0.00	2.9	10.0	0.0
31	0.07	0.00	0.00	0.3	0.04	0.000	0.00	0.00	3.2	5.4	0.0
56	0.06	0.00	0.03	1.7	0.38	0.000	0.02	0.00	1.2	5.0	0.8
46	0.07	0.00	0.04	1.6	0.11	0.000	0.01	0.00	1.1	3.9	0.0
62	0.06	0.00	0.06	2.8	0.20	0.000	0.00	0.00	2.7	5.0	0.9
20	0.05	0.00	0.04	1.8	0.11	0.000	0.00	0.01	0.7	2.9	0.0
48	0.07	0.01	0.07	8.0	0.21	0.000	0.02	0.00	3.2	4.8	0.6
32	0.05	0.00	0.00	0.8	0.04	0.000	0.00	0.00	2.1	3.2	0.0
46	0.06	0.00	0.05	1.4	0.12	0.002	0.01	0.00	1.1	4.9	0.2
54	0.07	0.00	0.01	1.1	0.07	0.000	0.00	0.00	2.4	8.1	0.0
37	0.05	0.00	0.02	0.2	0.02	0.000	0.00	0.00	1.2	3.9	0.0
81	0.07	0.01	0.03	7.5	0.21	0.000	0.02	0.00	6.5	11.5	0.4
37	0.04	0.00	0.05	2.1	0.09	0.000	0.00	0.00	3.0	5.6	0.0
39	39	39	39	39	39	39	39	39	39	39	n
82	0.09	0.01	0.05	3.4	0.20	0.001	0.02	0.00	3.9	9.8	0.3	Geo Mean
188	0.17	0.02	0.46	15.9	1.58	0.002	0.05	0.04	13.5	24.5	2.8	Max

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe2O3) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	ug/m3 29541 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3	ug/m3 29543 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
													Dofasco - Harbour Shore Tower												Dofasco - #4 Galvanizing Line											
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	63	0.06	0.00	0.02	2.7	0.31	0.000	0.02	0.00	3.8	11.1	0.4	138	0.09	0.00	0.17	15.8	0.50	0.000	0.03	0.03	17.7	28.2	0.6
	29	0	0	3	1	3	0	0	0	5	0	5	50	0.11	0.01	0.13	1.5	0.09	0.000	0.02	0.01	3.3	8.3	0.0	42	0.24	0.00	0.02	1.4	0.07	0.000	0.02	0.00	2.9	7.2	0.0
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	212	0.08	0.00	0.41	21.7	0.87	0.000	0.05	0.02	22.2	47.8	1.0	172	0.05	0.00	0.11	19.5	0.52	0.002	0.04	0.01	14.5	33.2	0.7
	4	0	0	0	0	0	0	8	4	0	0	10	74	0.04	0.00	0.07	4.2	0.36	0.000	0.02	0.01	5.1	11.5	0.0	162	0.05	0.02	0.16	19.4	0.65	0.000	0.03	0.02	16.1	29.4	0.6
N	7	0	0	2	0	0	0	0	0	10	0	1	49	0.05	0.00	0.00	1.5	0.09	0.000	0.00	0.00	3.2	8.2	0.0	79	0.16	0.00	0.02	3.3	0.31	0.000	0.03	0.03	4.0	9.0	0.4
	10	0	0	0	0	0	0	8	4	0	0	11	95	0.04	0.07	0.05	4.6	0.40	0.000	0.01	0.01	4.8	11.8	0.2	201	0.06	0.00	0.22	29.9	0.70	0.003	0.03	0.00	21.2	35.4	0.8
N	13	0	0	0	0	0	0	0	0	12	0	1	341	0.09	0.00	0.01	31.7	1.21	0.000	0.05	0.00	26.9	54.1	2.6	278	0.16	0.03	0.29	31.8	0.84	0.002	0.04	0.00	28.9	46.1	2.2
	16	0	0	0	0	4	8	0	0	0	5	18	262	0.08	0.02	0.52	31.9	0.84	0.000	0.04	0.02	14.5	35.7	0.8	191	0.05	0.01	0.11	15.3	0.38	0.002	0.03	0.00	12.5	30.3	0.5
N	19	0	0	0	0	6	6	0	0	0	1	14	21	0.00	0.00	0.01	0.6	0.02	0.000	0.00	0.00	1.3	4.0	0.0	42	0.20	0.00	0.02	1.4	0.08	0.000	0.05	0.00	4.2	7.3	0.0
	22	0	0	0	0	0	11	1	0	0	0	12	690	0.11	0.00	0.06	30.9	0.96	0.000	0.03	0.01	75.8	149.3	3.9	204	0.07	0.02	0.25	16.1	0.59	0.000	0.03	0.01	8.0	24.0	1.3
N	25	0	3	1	0	3	3	0	0	2	0	8	157	0.09	0.00	0.04	6.6	0.27	0.000	0.00	0.03	13.5	29.4	0.0	105	0.16	0.00	0.05	4.2	0.26	0.000	0.03	0.00	5.1	11.2	0.0
	28	0	0	0	0	0	2	10	0	0	0	10	383	0.06	0.00	0.18	40.7	1.23	0.000	0.13	0.01	18.6	49.1	1.2	285	0.03	0.01	0.12	21.3	0.83	0.000	0.05	0.02	19.3	37.5	1.6
N	31	6	6	0	0	0	0	0	0	0	5	18	50	0.01	0.00	0.00	2.5	0.08	0.000	0.00	0.00	4.1	7.6	0.0	104	0.03	0.00	0.04	5.8	0.53	0.000	0.05	0.02	3.0	8.2	0.8
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	208	0.08	0.00	0.75	18.8	0.54	0.000	0.03	0.00	21.0	31.8	0.2	132	0.04	0.00	0.08	9.7	0.33	0.004	0.02	0.01	12.0	22.5	0.2
	6	0	1	8	0	0	0	0	0	3	0	8	129	0.05	0.00	0.03	4.6	0.27	0.000	0.01	0.00	8.0	13.5	0.4	145	0.17	0.00	0.09	6.0	0.36	0.000	0.05	0.00	10.8	17.6	1.4
N	9	0	0	0	0	2	8	0	0	2	0	6	367	0.03	0.00	0.00	5.7	0.14	0.000	0.00	0.00	30.0	49.9	1.3	156	0.10	0.00	0.02	9.5	0.40	0.001	0.02	0.00	11.2	15.7	0.3
	12	1	2	6	0	0	0	0	2	1	0	9	82	0.04	0.00	0.03	4.8	0.15	0.000	0.00	0.02	8.0	14.3	0.0	100	0.12	0.00	0.04	6.3	0.43	0.000	0.04	0.05	5.8	12.9	0.9
N	15	0	0	0	0	0	6	3	0	3	0	7	133	0.12	0.00	0.09	8.6	0.28	0.000	0.01	0.05	11.0	22.4	0.0	138	0.07	0.00	0.06	9.3	0.31	0.001	0.00	0.04	14.8	27.4	0.0
	18	0	0	0	0	0	9	0	0	3	0	9	453	0.15	0.02	0.16	54.5	1.12	0.003	0.05	0.02	32.4	62.1	2.8	169	0.14	0.00	0.32	15.3	0.48	0.003	0.00	0.00	15.2	25.1	1.1
N	21	0	0	0	0	3	3	0	0	6	0	4	173	0.17	0.00	0.07	22.6	0.72	0.002	0.02	0.01	17.4	24.8	0.9	56	0.09	0.00	0.04	3.9	0.16	0.000	0.00	0.00	5.3	7.6	0.0
	24	0	8	0	0	0	0	0	0	4	0	6	75	0.04	0.00	0.02	5.6	0.38	0.000	0.02	0.00	4.2	13.0	0.1	103	0.15	0.00	0.17	9.3	0.43	0.000	0.06	0.00	8.2	15.8	0.6
N	27	0	0	0	0	0	1	9	2	0	0	8	119	0.04	0.00	0.09	15.6	0.54	0.000	0.02	0.00	8.8	15.5	1.0	169	0.05	0.01	0.17	8.4	0.47	0.001	0.02	0.00	22.0	31.1	0.5
N	30	0	2	0	0	0	5	2	1	2	3	10	241	0.09	0.00	0.00	10.9	0.45	0.000	0.00	0.00	22.2	31.1	0.0	167	0.16	0.00	0.14	21.1	0.50	0.001	0.03	0.00	11.6	22.7	0.5
N	OCT 3	0	0	0	0	0	0	2	1	9	0	1	125	0.14	0.00	0.13	14.7	0.30	0.000	0.00	0.00	11.2	26.7	0.1	155	0.12	0.00	0.11	10.9	0.28	0.000	0.02	0.00	9.8	19.9	0.1
	6	0	0	0	0	2	8	2	0	0	3	14	184	0.06	0.02	0.09	16.3	0.70	0.000	0.00	0.00	22.9	36.8	0.0	92	0.03	0.01	0.05	3.8	0.25	0.000	0.01	0.00	15.8	28.2	0.0
N	9	2	0	1	0	2	4	0	1	2	0	5	335	0.09	0.00	0.06	25.1	0.77	0.000	0.02	0.02	40.4	80.5	2.0	155	0.10	0.02	0.05	8.1	0.27	0.000	0.02	0.02	11.8	27.0	0.5
	12	0	0	5	0	0	1	2	0	4	0	5	77	0.05	0.00	0.02	2.4	0.38	0.000	0.00	0.04	5.0	11.3	0.0	94	0.13	0.00	0.04	4.0	0.31	0.000	0.03	0.01	7.6	16.5	0.0
N	15	0	0	0	0	0	3	9	0	0	0	9	145	0.05	0.01	0.73	12.2	0.77	0.000	0.00	0.00	14.8	27.9	0.0	168	0.04	0.00	0.10	16.1	0.65	0.000	0.02	0.00	19.2	29.3	0.4
	18	0	0	0	0	0	4	8	0	0	0	11	113	0.03	0.00	0.07	8.7	0.46	0.000	0.01	0.00	7.6	13.8	1.7	96	0.03	0.00	0.07	9.4	0.29	0.000	0.02	0.00	13.6	19.5	1.1
N	21	0	0	0	0	0	10	0	0	2	0	9	92	0.06	0.00	0.13	9.4	0.26	0.000	0.02	0.00	7.3	11.6	0.4	87	0.06	0.00	0.05	4.2	0.46	0.000	0.03	0.00	7.2	12.7	0.5
	24	0	0	0	0	5	7	0	0	0	0	13	108	0.03	0.00	0.02	13.2	0.20	0.000	0.02	0.02	19.7	24.3	0.1	91	0.05	0.01	0.11	7.3	0.42	0.003	0.03	0.00	3.0	7.4	0.6
N	27	4	8	0	0	0	0	0	0	0	0	16	8	0.03	0.00	0.00	0.7	0.02	0.000	0.00	0.00	0.7	1.5	0.0	23	0.05	0.00	0.00	0.9	0.08	0.000	0.03	0.00	1.7	2.8	0.0
	30	0	10	2	0	0	0	0	0	0	0	10	9	0.00	0.00	0.00	0.2	0.00	0.000	0.00	0.00	0.3	2.0	0.0	35	0.06	0.00	0.01	1.9	0.10	0.000	0.03	0.00	2.1	3.8	0.0
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	59	0.02	0.00	0.09	6.0	0.11	0.000	0.02	0.00	9.6	14.5	0.0	61	0.02	0.00	0.02	7.2	0.13	0.000	0.00	0.00	8.9	15.0	0.1
	5	0	0	0	0	4	3	1	0	4	0	5	100	0.04	0.00	0.03	10.8	0.25	0.000	0.02	0.00	10.4	20.2	0.2	82	0.05	0.00	0.03	6.2	0.20	0.000	0.02	0.00	4.5	7.3	0.0
N	8	1	0	0	0	0	0	1	1	9	0	1	30	0.02	0.00	0.01	0.9	0.06	0.000	0.01	0.00	2.8	5.6	0.0	63	0.06	0.00	0.19	8.4	0.33	0.000	0.02	0.00	4.3	7.2	0.8
N	12	0	0	0	0	0	9	3	0	0	0	11	40	0.03	0.00	0.11	3.2	0.13	0.000	0.01	0.00	2.7	4.9	0.0	69	0.02	0.00	0.05	9.1	0.07	0.000	0.00	0.00	18.5	26.6	0.0
	14	0	0	3	0	0	3	0	0	6	0	4	57	0.03	0.00	0.03	2.2	0.11	0.000	0.02	0.00	4.0	8.9	0.0	70	0.07	0.00	0.03	4.9	0.20	0.000	0.02	0.00	5.3	10.7	0.3
	17	1	0	8	0	0	0	0	1	2	0	7	12	0.01	0.00	0.00	0.4	0.02	0.000	0.01	0.00	1.8	2.0	0.0	43	0.05	0.00	0.01	2.4	0.23	0.000	0.01	0.00	2.7	5.6	0.3
	20	0	0	0	0	2	5	2	3	0	4	15	16	0.03	0.00	0.02	1.9	0.05	0.000	0.00	0.01	0.6	2.2	0.0	31	0.06	0.00	0.15	9.0	0.15	0.000	0.00	0.00	6.6	9.2	0.0
													40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	n
													94	0.04	0.01	0.04	5.9	0.23	0.001	0.01	0.01	7.5	15.5	0.2	101	0.07	0.01	0.06	7.4	0.30	0.001	0.02	0.01	8.3	15.5	0.3	Geo Mean
													690	0.17	0.07	0.75	54.5	1.23	0.003	0.13	0.05	75.8	149.3	3.9	285	0.24	0.03	0.32	31.8	0.84	0.004	0.08	0.05	28.9	46.1	2.2	Max

TABLE 2e

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe203)
Cr - 1.5 V - 2 Cu - 100
Mn - 2.5 Ni - 2 Pb - 5

	1991 DATE	N	HOURS OF WIND/12 HOURS WOODWARD STP NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	ug/m3 29545 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
													Dofasco - Quality Training Centre											
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	81	0.23	0.00	0.05	4.7	0.27	0.000	0.02	0.00	7.0	15.7	0.7
	29	0	0	3	1	3	0	0	0	5	0	5	61	0.08	0.01	0.07	3.1	0.16	0.000	0.01	0.00	5.3	9.8	1.0
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	75	0.15	0.00	0.02	2.6	0.24	0.000	0.00	0.00	2.9	10.7	1.0
	4	0	0	0	0	0	0	8	4	0	0	10	56	0.11	0.00	0.08	3.8	0.27	0.000	0.00	0.00	3.9	12.1	0.5
N	7	0	0	2	0	0	0	0	0	10	0	1	131	0.12	0.00	0.43	12.2	0.50	0.002	0.03	0.00	2.9	6.7	1.3
	10	0	0	0	0	0	0	8	4	0	0	11	98	0.11	0.00	0.04	8.4	0.37	0.000	0.01	0.00	2.5	6.5	1.0
N	13	0	0	0	0	0	0	0	0	12	0	1	107	0.20	0.00	0.04	3.6	0.24	0.000	0.02	0.00	12.0	16.1	2.0
	16	0	0	0	0	4	8	0	0	0	5	13	163	0.15	0.00	0.08	10.5	0.48	0.002	0.00	0.00	5.6	18.6	1.7
N	19	0	0	0	0	6	6	0	0	0	1	14	151	0.13	0.00	0.06	5.0	0.28	0.000	0.07	0.00	11.4	22.9	0.8
	22	0	0	0	0	0	11	1	0	0	0	12	160	0.10	0.00	0.04	9.3	0.37	0.000	0.03	0.00	4.9	15.6	1.7
N	25	0	3	1	0	3	3	0	0	2	0	8	146	0.19	0.00	0.04	4.9	0.38	0.000	0.01	0.01	7.4	17.1	0.7
	28	0	0	0	0	0	2	10	0	0	0	10	151	0.14	0.00	0.05	5.2	0.38	0.000	0.02	0.01	6.1	14.9	1.8
N	31	6	6	0	0	0	0	0	0	0	5	18	218	0.13	0.00	0.24	23.9	0.56	0.000	0.03	0.00	12.9	19.9	2.1
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	90	0.11	0.00	0.03	5.6	0.17	0.000	0.01	0.00	3.6	8.1	0.3
	6	0	1	8	0	0	0	0	0	3	0	8	258	0.13	0.00	0.14	20.1	0.92	0.000	0.04	0.01	14.8	26.4	3.3
N	9	0	0	0	0	2	8	0	0	2	0	6	133	0.09	0.00	0.01	5.0	0.29	0.000	0.00	0.00	5.2	11.6	0.7
	12	1	2	6	0	0	0	0	2	1	0	9	182	0.12	0.00	0.27	12.5	0.48	0.010	0.00	0.02	9.4	22.9	2.4
N	15	0	0	0	0	0	6	3	0	3	0	7	104	0.16	0.00	0.03	3.6	0.21	0.000	0.00	0.06	3.5	13.2	0.5
	18	0	0	0	0	0	9	0	0	3	0	9	161	0.09	0.01	0.05	9.7	0.53	0.000	0.03	0.03	6.3	18.0	2.3
N	21	0	0	0	0	3	3	0	0	6	0	4	59	0.16	0.00	0.04	3.2	0.14	0.000	0.00	0.01	3.4	9.4	0.3
	24	0	8	0	0	0	0	0	0	4	0	6	163	0.11	0.00	0.14	7.2	0.60	0.000	0.04	0.01	9.7	24.1	2.4
N	27	0	0	0	0	0	1	9	2	0	0	8	57	0.14	0.00	0.04	3.0	0.17	0.000	0.00	0.03	3.1	7.2	0.6
N	30	0	2	0	0	0	5	2	1	2	3	10	159	0.21	0.00	0.07	11.9	0.37	0.000	0.02	0.00	9.0	20.8	1.5
N	OCT 3	0	0	0	0	0	0	2	1	9	0	1	118	0.20	0.00	0.05	4.7	0.31	0.000	0.02	0.00	6.0	15.8	1.3
	6	0	0	0	0	2	8	2	0	0	3	14	51	0.05	0.00	0.02	2.2	0.17	0.000	0.00	0.00	1.1	6.0	0.0
N	9	2	0	1	0	2	4	0	1	2	0	5	166	0.12	0.01	0.13	8.1	0.48	0.000	0.02	0.03	8.5	24.5	0.9
	12	0	0	5	0	0	1	2	0	4	0	5	123	0.38	0.00	0.15	4.6	0.48	0.000	0.02	0.00	5.1	17.4	1.1
N	15	0	0	0	0	0	3	9	0	0	0	9	71	0.11	0.00	0.06	3.6	0.36	0.001	0.00	0.00	3.9	10.5	1.0
	18	0	0	0	0	0	4	8	0	0	0	11	67	0.06	0.00	0.03	2.7	0.23	0.000	0.02	0.00	3.1	8.7	1.5
N	21	0	0	0	0	0	10	0	0	2	0	9	47	0.07	0.00	0.02	1.9	0.11	0.000	0.01	0.00	2.2	5.2	0.3
	24	0	0	0	0	5	7	0	0	0	0	13	61	0.04	0.00	0.02	2.7	0.17	0.000	0.00	0.00	2.6	6.7	0.4
N	27	4	8	0	0	0	0	0	0	0	0	16	22	0.00	0.00	0.00	1.2	0.07	0.000	0.00	0.00	0.5	1.8	0.0
	30	0	10	2	0	0	0	0	0	0	0	10	106	0.04	0.00	0.03	22.7	0.28	0.000	0.01	0.00	9.3	13.9	0.7
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	27	0.05	0.00	0.00	0.9	0.05	0.000	0.00	0.00	1.5	2.6	0.0
	5	0	0	0	0	4	3	1	0	4	0	5	62	0.07	0.00	0.01	3.0	0.16	0.000	0.00	0.00	3.9	7.7	0.6
N	8	1	0	0	0	0	0	1	1	9	0	1	64	0.13	0.00	0.03	3.1	0.17	0.000	0.00	0.00	4.6	8.4	0.8
N	12	0	0	0	0	0	9	3	0	0	0	11	31	0.06	0.00	0.02	0.8	0.05	0.000	0.00	0.00	1.7	3.7	0.0
	14	0	0	3	0	0	3	0	0	6	0	4	89	0.07	0.00	0.03	5.7	0.19	0.000	0.01	0.00	6.7	13.1	0.8
	17	1	0	8	0	0	0	0	1	2	0	7	71	0.05	0.00	0.03	5.3	0.26	0.000	0.00	0.00	4.9	8.1	0.7
	20	0	0	0	0	2	5	2	3	0	4	15	30	0.09	0.00	0.03	1.5	0.08	0.000	0.00	0.00	5.2	7.2	0.0
													40	40	40	40	40	40	40	40	40	40	40	40 n
													89	0.10	0.01	0.03	4.7	0.25	0.001	0.01	0.01	4.3	10.9	0.7 Geo Mean
													258	0.38	0.01	0.43	23.9	0.92	0.01	0.07	0.06	14.8	26.4	3.3 Max

TABLE 2f

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe203) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	ug/m3 29555 TSP	Cu	Ni	Pb	Fe	Mn	Cd	Cr	V	Strathearn - Dofasco - No. 8 Plant Stores FreeC	TotalC	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	60	0.07	0.01	0.04	3.9	0.17	0.000	0.01	0.02	3.9	9.2	0.3
	29	0	0	3	1	3	0	0	0	5	0	5	40	0.08	0.00	0.00	0.5	0.03	0.000	0.00	0.01	2.1	6.6	0.0
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	71	0.04	0.00	0.11	4.3	0.30	0.001	0.01	0.00	2.8	7.4	1.0
	4	0	0	0	0	0	0	8	4	0	0	10	54	0.05	0.00	0.07	3.9	0.17	0.000	0.00	0.00	2.4	7.8	0.0
N	7	0	0	2	0	0	0	0	0	10	0	1	82	0.13	0.00	0.07	2.5	0.21	0.000	0.02	0.00	2.7	8.6	1.1
	10	0	0	0	0	0	0	8	4	0	0	11	82	0.05	0.00	0.03	6.9	0.22	0.000	0.00	0.00	4.6	12.2	0.7
N	13	0	0	0	0	0	0	0	0	12	0	1	102	0.31	0.01	0.05	5.1	0.26	0.000	0.02	0.00	4.3	15.9	1.4
	16	0	0	0	0	4	8	0	0	0	5	18	144	0.08	0.01	0.07	7.9	0.53	0.000	0.02	0.00	4.4	17.9	1.7
N	19	0	0	0	0	6	6	0	0	0	1	14	56	0.08	0.00	0.03	0.8	0.06	0.000	0.00	0.00	4.0	13.1	0.2
	22	0	0	0	0	0	11	1	0	0	0	12	121	0.05	0.01	0.07	3.3	0.32	0.000	0.01	0.00	4.9	13.0	1.4
N	25	0	3	1	0	3	3	0	0	2	0	8	76	0.10	0.01	0.04	1.3	0.08	0.000	0.00	0.00	2.8	7.7	0.0
	28	0	0	0	0	0	2	10	0	0	0	10	154	0.07	0.02	0.06	4.2	0.36	0.000	0.03	0.01	2.8	11.8	1.6
N	31	6	6	0	0	0	0	0	0	0	5	18	63	0.05	0.00	0.04	1.9	0.15	0.000	0.00	0.00	1.5	7.0	1.0
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	65	0.06	0.00	0.06	2.8	0.16	0.000	0.00	0.00	3.9	7.4	0.0
	6	0	1	8	0	0	0	0	0	3	0	8	236	0.19	0.00	0.15	12.2	0.52	0.000	0.05	0.00	8.7	19.0	4.3
N	9	0	0	0	0	2	8	0	0	2	0	6	103	0.10	0.00	0.04	3.7	0.23	0.001	0.00	0.00	2.8	8.3	0.0
	12	1	2	6	0	0	0	0	2	1	0	9	231	0.14	0.01	0.16	11.0	0.54	0.000	0.02	0.00	5.9	19.9	6.2
N	15	0	0	0	0	0	6	3	0	3	0	7	71	0.08	0.00	0.03	1.8	0.12	0.000	0.00	0.00	1.8	9.2	0.2
	18	0	0	0	0	0	9	0	0	3	0	9	136	0.10	0.00	0.05	5.0	0.33	0.000	0.02	0.00	4.2	16.5	7.4
N	21	0	0	0	0	3	3	0	0	6	0	4	40	0.10	0.00	0.06	1.8	0.10	0.000	0.00	0.00	3.1	7.0	0.9
	24	0	8	0	0	0	0	0	0	4	0	6	159	0.14	0.00	0.12	5.1	0.45	0.000	0.03	0.00	5.5	17.6	3.4
N	27	0	0	0	0	0	1	9	2	0	0	8	38	0.05	0.00	0.05	2.8	0.13	0.000	0.00	0.00	2.1	4.4	0.1
N	30	0	2	0	0	0	5	2	1	2	3	10	112	0.33	0.00	0.12	5.6	0.23	0.000	0.00	0.00	3.2	10.4	0.8
N	OCT 3	0	0	0	0	0	0	2	1	9	0	1	79	0.39	0.00	0.07	3.6	0.16	0.000	0.02	0.02	4.4	12.9	0.6
	6	0	0	0	0	2	8	2	0	0	3	14	32	0.03	0.00	0.01	1.2	0.12	0.000	0.00	0.00	0.6	3.7	0.0
N	9	2	0	1	0	2	4	0	1	2	0	5	118	0.15	0.02	0.08	4.4	0.34	0.002	0.02	0.00	5.6	15.8	0.7
	12	0	0	5	0	0	1	2	0	4	0	5	63	0.98	0.01	0.40	1.5	0.16	0.002	0.01	0.00	3.3	9.7	0.0
N	15	0	0	0	0	0	3	9	0	0	0	9	46	0.06	0.00	0.02	2.4	0.19	0.000	0.00	0.02	1.7	5.7	0.5
	18	0	0	0	0	0	4	8	0	0	0	11	61	0.04	0.01	0.02	2.2	0.18	0.000	0.01	0.00	2.3	7.1	1.2
N	21	0	0	0	0	0	10	0	0	2	0	9	32	0.03	0.00	0.00	1.1	0.09	0.000	0.00	0.00	1.3	3.8	0.1
	24	0	0	0	0	5	7	0	0	0	0	13	45	0.04	0.00	0.00	1.3	0.11	0.000	0.00	0.00	2.1	4.9	0.2
N	27	4	8	0	0	0	0	0	0	0	0	16	9	0.03	0.00	0.01	0.2	0.01	0.000	0.00	0.00	0.7	1.4	0.0
	30	0	10	2	0	0	0	0	0	0	0	10	41	0.05	0.00	0.02	1.0	0.08	0.000	0.00	0.00	1.2	4.7	0.6
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	18	0.01	0.00	0.00	0.8	0.03	0.000	0.00	0.00	0.9	1.9	0.0
	5	0	0	0	0	4	3	1	0	4	0	5	46	0.05	0.00	0.02	1.5	0.13	0.000	0.00	0.02	1.6	5.3	0.5
N	8	1	0	0	0	0	0	1	1	9	0	1	35	0.03	0.00	0.03	1.6	0.10	0.000	0.01	0.00	1.5	5.0	0.4
N	12	0	0	0	0	0	9	3	0	0	0	11	21	0.03	0.00	0.00	0.8	0.04	0.000	0.02	0.00	1.0	2.6	0.0
	14	0	0	3	0	0	3	0	0	6	0	4	52	0.05	0.00	0.00	1.3	0.09	0.000	0.02	0.00	2.3	6.0	0.3
	17	1	0	8	0	0	0	0	1	2	0	7	20	0.03	0.00	0.00	0.8	0.04	0.000	0.00	0.01	0.7	2.4	0.0
	20	0	0	0	0	2	5	2	3	0	4	15	11	0.03	0.00	0.03	0.9	0.03	0.000	0.00	0.00	0.7	1.8	0.0
													40	40	40	40	40	40	40	40	40	40	40	40 n
													59	0.07	0.01	0.03	2.2	0.14	0.001	0.01	0.01	2.6	7.3	0.3 Geo Mean
													236	0.98	0.02	0.4	12.2	0.54	0.002	0.05	0.02	8.7	19.9	7.4 Max

ONTARIO OBJECTIVES : TSP - 120 (24 hour),60 (annual geo.mean)
Cd - 2 Fe - 25(Fe203) Cu - 100 Ni - 2
Mn - 2.5 Cr - 1.5 V - 2 Pb - 5

ug/m3 29557 TSP	Cu	Ni	Pb	Philips Rod Mill Fe	Mn	Cd	Cr	V	FreeC	TotalC	CO3
54	0.06	0.02	0.05	1.9	0.14	0.000	0.00	0.02	4.3	10.2	0.3
44	0.47	0.00	0.09	0.9	0.03	0.000	0.01	0.01	1.8	6.6	0.0
95	0.07	0.00	0.02	2.9	0.14	0.000	0.00	0.00	16.2	25.4	0.4
52	0.09	0.00	0.10	3.8	0.17	0.000	0.00	0.00	4.2	8.0	0.0
40	0.08	0.00	0.04	1.1	0.07	0.000	0.00	0.00	1.5	5.3	0.1
88	0.05	0.00	0.07	7.1	0.23	0.000	0.02	0.00	5.1	10.8	0.6
125	1.13	0.02	0.13	7.6	0.36	0.001	0.03	0.00	8.1	20.1	2.5
140	0.10	0.02	0.06	5.3	0.23	0.002	0.01	0.00	9.8	16.7	1.0
26	0.08	0.00	0.02	0.2	0.03	0.000	0.00	0.00	0.6	4.4	0.0
149	0.13	0.03	0.15	6.0	0.30	0.000	0.01	0.00	8.1	18.7	1.3
75	0.08	0.02	0.09	5.2	0.29	0.000	0.02	0.00	2.7	8.7	0.0
155	0.16	0.02	0.04	0.7	0.04	0.000	0.00	0.01	11.5	21.8	1.4
38	0.06	0.00	0.01	0.9	0.05	0.000	0.00	0.00	2.1	4.0	0.6
106	0.04	0.00	0.13	3.4	0.11	0.000	0.00	0.00	16.9	22.1	0.1
200	0.16	0.02	0.13	5.7	0.53	0.000	0.00	0.02	4.8	12.9	1.7
114	0.56	0.01	0.09	4.2	0.14	0.001	0.00	0.00	7.1	13.2	0.4
104	0.14	0.01	0.10	4.2	0.22	0.000	0.01	0.00	1.9	8.5	0.2
78	0.14	0.00	0.04	1.3	0.08	0.000	0.01	0.00	6.6	14.4	0.0
153	0.13	0.01	0.10	7.3	0.28	0.002	0.05	0.00	8.0	13.1	2.7
38	0.04	0.00	0.04	0.7	0.05	0.000	0.01	0.00	2.3	4.3	0.0
97	0.13	0.00	0.09	4.8	0.25	0.000	0.01	0.03	4.9	11.9	1.7
38	0.05	0.00	0.08	2.5	0.14	0.000	0.00	0.00	1.5	4.6	0.0
104	0.28	0.00	0.14	4.3	0.18	0.002	0.02	0.00	4.8	13.3	0.5
101	1.94	0.03	0.26	4.1	0.15	0.001	0.03	0.00	7.5	15.1	0.7
73	0.04	0.01	0.00	0.7	0.06	0.001	0.02	0.00	21.4	26.1	0.0
97	1.26	0.02	0.23	3.1	0.21	0.003	0.03	0.02	6.2	15.0	0.8
52	0.05	0.02	0.03	1.4	0.16	0.003	0.00	0.02	3.3	9.0	0.0
47	0.07	0.00	0.05	2.5	0.21	0.002	0.01	0.00	3.5	7.6	0.0
65	0.03	0.00	0.02	1.8	0.11	0.000	0.00	0.00	7.3	13.8	0.9
44	0.05	0.00	0.02	0.8	0.05	0.020	0.00	0.00	8.1	11.3	0.0
54	0.07	0.00	0.03	2.0	0.09	0.000	0.00	0.00	2.7	6.6	0.8
6	0.03	0.00	0.00	0.0	0.00	0.000	0.00	0.01	0.5	1.4	0.9
14	0.03	0.00	0.00	0.1	0.02	0.000	0.00	0.00	0.4	1.6	0.0
40	0.01	0.00	0.01	0.6	0.02	0.000	0.00	0.00	11.3	13.6	0.0
49	0.13	0.00	0.03	1.7	0.06	0.001	0.00	0.02	4.5	7.4	0.4
29	0.03	0.00	0.02	2.3	0.09	0.000	0.01	0.00	2.4	4.6	0.1
51	0.03	0.00	0.00	1.2	0.04	0.001	0.02	0.00	19.5	23.4	0.0
54	0.07	0.00	0.01	2.6	0.07	0.001	0.02	0.00	2.9	6.2	0.1
11	0.03	0.00	0.00	0.4	0.00	0.000	0.01	0.00	0.8	1.6	0.0
39	39	39	39	39	39	39	39	39	39	39	39
60	0.09	0.01	0.04	1.8	0.09	0.000	0.01	0.01	4.1	9.2	0.2
200	1.94	0.03	0.26	7.6	0.53	0.02	0.05	0.03	21.4	26.1	2.7

TABLE 3

DUSTFALL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

OBJECTIVES : 7.0 - 1 MONTH

g/sq.m/30 days

STATION	LOCATION	WEEK STARTING 26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
29531	J.I. CASE	7.0	6.8	4.6	5.9	2.0	1.6	1.7	3.5	1.9	2.8	4.0	2.4	2.5	5.9	1.8	3.6	4.7	3.7
29533	STELCO CRANE 56 RUNWAY	9.3	6.1	12.0	5.7	3.8	4.0	2.6	4.0	5.6	6.6	6.8	5.3	9.3	3.5	7.6	4.9	5.6	6.0
29535	STELCO CHEM LAB	12.0	13.0	18.0	11.0	6.0	12.0	13.0	23.0	11.0	14.0	10.0	10.0	9.7	8.8	11.0	11.0	7.2	11.8
29537	STELCO EAST FILTRATION PLANT	10.0	9.5	8.8	6.1	2.7	4.4	3.0	7.0	4.2		4.2	7.1	4.5	5.1	2.6	6.4	6.5	5.8
29539	STELCO GENERAL OFFICE	5.2	8.3	7.9	8.3	2.0	3.4	3.7	5.9	2.0	13.0	6.8	4.0	7.5	3.3	3.8	4.6	4.3	5.5
29541	DOFASCO HARBOUR TOWER	6.0	17.0	7.5	17.0	2.6	2.7	5.2	4.2	5.2	9.8	19.0	5.8	15.0	1.3	7.2	3.4	21.0	8.8
29543	DOFASCO #4 GALV LINE	9.4	6.9	12.0	5.5	4.0	6.0	5.0	9.4	9.2	7.6	9.7	7.8	7.3	2.2	15.0	5.8	8.1	7.7
29545	DOFASCO QUALITY TRAIN. CNTR.	10.0	7.7	7.1	9.2	2.9	6.6	6.1	6.6	3.6	6.8	7.4	4.1	5.0	16.0	7.0	7.1	4.7	6.9
29547	BEACH STRIP PIER 25	5.1	4.2	4.0	4.2	3.4	5.0	2.2	2.2	8.5	2.3	2.5	3.3	8.9	1.8	2.1	1.8	1.9	3.7

TABLE 4a

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29531 - J.I. CASE — g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0020	0.0020	0.0012	0.0013	0.0010	0.0015	0.0013	0.0013	0.0007	0.0010	0.0013	0.0014	0.0014	0.0021	0.0012	0.0020	0.0019	0.0014
NICKEL	0.0008	0.0008	0.0005	0.0021	0.0002	0.0059	0.0002	0.0003	0.0002	0.0003	0.0005	0.0000	0.0005	0.0006	0.0002	0.0006	0.0006	0.0008
LEAD	0.0011	0.0013	0.0008	0.0016	0.0009	0.0011	0.0011	0.0000	0.0012	0.0011	0.0008	0.0005	0.0009	0.0029	0.0011	0.0020	0.0014	0.0012
ZINC	0.0130	0.0120	0.0069	0.0110	0.0066	0.0076	0.0081	0.0071	0.0094	0.0099	0.0120	0.0073	0.0420	0.0250	0.0160	0.0160	0.0400	0.0147
IRON	0.4100	0.4900	0.1700	0.4200	0.2000	0.3600	0.4900	0.2400	0.1500	0.2600	0.2500	0.1200	0.2900	0.6800	0.1800	0.3800	0.4600	0.3265
MANGANESE	0.0240	0.0240	0.0093	0.0180	0.0310	0.0300	0.0330	0.0190	0.0550	0.0330	0.0430	0.0100	0.0830	0.0390	0.0190	0.0190	0.0460	0.0315
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0017	0.0017	0.0014	0.0002	0.0009	0.0110	0.0015	0.0016	0.0020	0.0018	0.0010	0.0006	0.0012	0.0020	0.0018	0.0026	0.0030	0.0021
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TITANIUM	0.0036	0.0047	0.0017	0.0027	0.0019	0.0012	0.0043	0.0028	0.0018	0.0007	0.0026	0.0016	0.0027	0.0060	0.0027	0.0034	0.0045	0.0029
VANADIUM	0.0006	0.0011	0.0007	0.0028	0.0022	0.0006	0.0011	0.0005	0.0005	0.0004	0.0006	0.0006	0.0007	0.0010	0.0006	0.0016	0.0009	0.0010
TOTAL LOADING	7.0	6.8	4.6	5.9	2.0	1.6	1.7	3.5	1.9	2.8	4.0	2.4	2.5	5.9	1.8	3.6	4.7	

TABLE 4b

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29533 - STELCO CRANE 56 RUNWAY g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0012	0.0010	0.0011	0.0012	0.0009	0.0014	0.0012	0.0037	0.0012	0.0023	0.0019	0.0011	0.0030	0.0015	0.0016	0.0018	0.0025	0.0017
NICKEL	0.0004	0.0003	0.0004	0.0003	0.0003	0.0034	0.0030	0.0004	0.0004	0.0006	0.0003	0.0010	0.0004	0.0004	0.0005	0.0004	0.0005	0.0008
LEAD	0.0022	0.0005	0.0007	0.0011	0.0007	0.0011	0.0008	0.0000	0.0024	0.0012	0.0022	0.0016	0.0021	0.0017	0.0016	0.0020	0.0013	0.0014
ZINC	0.0077	0.0046	0.0100	0.0059	0.0057	0.0077	0.0066	0.0081	0.0120	0.0140	0.0170	0.0083	0.0190	0.0091	0.0019	0.0021	0.0020	0.0083
IRON	0.2500	0.1200	0.3500	0.2000	0.3400	0.6000	0.4000	0.2800	0.5300	0.5400	0.5200	0.3600	0.5800	0.3800	0.5500	0.5100	0.4600	0.4100
MANGANESE	0.0340	0.0240	0.0490	0.0220	0.0410	0.0670	0.0390	0.0300	0.0690	0.0570	0.0540	0.0410	0.0600	0.0350	0.0000	0.0000	0.0000	0.0366
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0020	0.0016	0.0025	0.0014	0.0018	0.0035	0.0082	0.0016	0.0036	0.0029	0.0025	0.0036	0.0026	0.0020	0.0030	0.0027	0.0034	0.0029
LITHIUM	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TITANIUM	0.0082	0.0057	0.0097	0.0037	0.0076	0.0130	0.0073	0.0054	0.0100	0.0100	0.0074	0.0066	0.0079	0.0054	0.0036	0.0110	0.0150	0.0084
VANADIUM	0.0014	0.0011	0.0018	0.0019	0.0019	0.0031	0.0021	0.0010	0.0022	0.0023	0.0020	0.0016	0.0019	0.0010	0.0030	0.0019	0.0026	0.0019
TOTAL LOADING	9.3 ---	6.1	12.0 ---	5.7	3.8	4.0	2.6	4.0	5.6	6.6	6.8	5.3	9.3 ---	3.5	7.6 ---	4.9	5.6	

TABLE 4c

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29535 - STELCO CHEM LAB g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0036	0.0018	0.0020	0.0024	0.0017	0.0023	0.0030	0.0034	0.0026	0.0038	0.0023	0.0019	0.0022	0.0025	0.0042	0.0029	0.0031	0.0027
NICKEL	0.0013	0.0009	0.0017	0.0010	0.0032	0.0130	0.0130	0.0016	0.0012	0.0021	0.0009	0.0009	0.0011	0.0009	0.0015	0.0016	0.0026	0.0029
LEAD	0.0019	0.0026	0.0027	0.0035	0.0021	0.0049	0.0037	0.0091	0.0055	0.0095	0.0058	0.0047	0.0033	0.0055	0.0086	0.0065	0.0032	0.0049
ZINC	0.0180	0.0140	0.0280	0.0210	0.0170	0.0310	0.0280	0.0560	0.0310	0.0610	0.0510	0.0250	0.0300	0.0230	0.0560	0.0550	0.0260	0.0336
IRON	0.6600	0.7700	1.3000	0.6900	0.6300	1.6000	2.0000	1.7000	1.2000	1.7000	1.0000	0.9200	0.8500	0.9400	1.4000	1.5000	1.0000	1.1682
MANGANESE	0.0380	0.0590	0.0580	0.0380	0.0440	0.1100	0.1100	0.0000	0.0970	0.0000	0.0077	0.0690	0.0580	0.0000	0.0000	0.0000	0.0000	0.0405
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0001	0.0001	0.0000	0.0000	0.0000	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0031	0.0040	0.0053	0.0027	0.0024	0.0140	0.0084	0.0073	0.0048	0.0082	0.0037	0.0036	0.0028	0.0044	0.0068	0.0068	0.0082	0.0057
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TITANIUM	0.0066	0.0099	0.0087	0.0050	0.0052	0.0160	0.0160	0.0120	0.0083	0.0130	0.0068	0.0091	0.0011	0.0110	0.0093	0.0013	0.0110	0.0088
VANADIUM	0.0012	0.0017	0.0017	0.0024	0.0023	0.0035	0.0034	0.0024	0.0020	0.0030	0.0016	0.0021	0.0015	0.0025	0.0023	0.0026	0.0023	0.0023
TOTAL LOADING	12.0	13.0	18.0	11.0	6.0	12.0	13.0	23.0	11.0	14.0	10.0	10.0	9.7	8.8	11.0	11.0	7.2	

TABLE 4d

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29537 - STELCO EAST FILTRATION PLANT g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0016	0.0019	0.0019	0.0011	0.0010	0.0017	0.0018	0.0013	0.0014	0.0021	0.0025	0.0026	0.0017	0.0016	0.0021	0.0017	0.0018
NICKEL	0.0007	0.0009	0.0049	0.0016	0.0005	0.0008	0.0052	0.0005	0.0006	0.0007	0.0006	0.0005	0.0015	0.0004	0.0006	0.0008	0.0013
LEAD	0.0015	0.0024	0.0018	0.0014	0.0008	0.0031	0.0015	0.0023	0.0025	0.0013	0.0023	0.0027	0.0010	0.0011	0.0000	0.0036	0.0018
ZINC	0.0130	0.0130	0.0170	0.0094	0.0071	0.0130	0.0100	0.0130	0.0140	0.0170	0.0180	0.0320	0.0130	0.0270	0.0220	0.0220	0.0163
IRON	0.5600	0.5200	0.7200	0.3300	0.3700	0.9000	0.8500	0.6700	0.6700	0.5400	0.6600	0.4900	0.6000	0.3300	0.5200	0.8500	0.5988
MANGANESE	0.0290	0.0310	0.0390	0.0130	0.0160	0.0470	0.0520	0.0360	0.0390	0.0310	0.0470	0.0350	0.0180	0.0210	0.0440	0.0000	0.0311
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0020	0.0024	0.0023	0.0014	0.0010	0.0031	0.0028	0.0021	0.0023	0.0018	0.0025	0.0021	0.0016	0.0013	0.0026	0.0037	0.0022
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0007	0.0007	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
TITANIUM	0.0078	0.0073	0.0048	0.0028	0.0031	0.0069	0.0068	0.0057	0.0053	0.0041	0.0050	0.0049	0.0033	0.0030	0.0051	0.0097	0.0054
VANADIUM	0.0011	0.0025	0.0011	0.0011	0.0011	0.0017	0.0019	0.0009	0.0009	0.0016	0.0016	0.0015	0.0012	0.0010	0.0013	0.0018	0.0014
TOTAL LOADING	10.0 ---	9.5 ---	8.8 ---	6.1	2.7	4.4	3.0	7.0	4.2	4.2	7.1 ---	4.5	5.1	2.6	6.4	6.5	

TABLE 4e

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29539 - STELCO GENERAL OFFICE g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0029	0.0019	0.0023	0.0018	0.0018	0.0027	0.0012	0.0026	0.0012	0.0049	0.0016	0.0021	0.0032	0.0019	0.0019	0.0015	0.0016	0.0022
NICKEL	0.0027	0.0008	0.0017	0.0006	0.0000	0.0048	0.0003	0.0005	0.0006	0.0010	0.0006	0.0009	0.0010	0.0003	0.0004	0.0004	0.0008	0.0010
LEAD	0.0023	0.0130	0.0051	0.0058	0.0015	0.0058	0.0018	0.0000	0.0021	0.0011	0.0030	0.0039	0.0059	0.0024	0.0017	0.0020	0.0022	0.0035
ZINC	0.0150	0.0360	0.0430	0.0230	0.0100	0.0480	0.0140	0.0200	0.0130	0.0570	0.0270	0.0370	0.0460	0.0140	0.0190	0.0230	0.0230	0.0305
IRON	0.1800	0.3300	0.2100	0.4200	0.1900	0.5700	0.5400	0.4200	0.2400	1.0000	0.3400	0.2800	0.5200	0.2700	0.2500	0.3800	0.5100	0.3912
MANGANESE	0.0160	0.0270	0.0200	0.0230	0.0100	0.0390	0.0290	0.0240	0.0270	0.0630	0.0430	0.0220	0.0420	0.0150	0.0130	0.0250	0.0320	0.0276
ARSENIC	0.0000	.0003<T	.0002<T	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0002	0.0001	0.0001	0.0001	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0014	0.0015	0.0017	0.0018	0.0006	0.0057	0.0014	0.0017	0.0015	0.0037	0.0016	0.0014	0.0024	0.0011	0.0011	0.0018	0.0018	0.0019
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
TITANIUM	0.0031	0.0042	0.0035	0.0034	0.0017	0.0059	0.0060	0.0045	0.0026	0.0083	0.0051	0.0030	0.0065	0.0020	0.0027	0.0048	0.0053	0.0043
VANADIUM	0.0005	0.0010	0.0006	0.0014	0.0006	0.0016	0.0017	0.0009	0.0004	0.0016	0.0014	0.0012	0.0015	0.0009	0.0009	0.0009	0.0012	0.0011
TOTAL LOADING	5.2	8.3 ---	7.9 ---	8.3 ---	2.0	3.4	3.7	5.9	2.0	13.0 ---	6.8	5.3	7.5 ---	3.3	3.8	4.6	4.3	

TABLE 4f

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29541 - DOFASCO HARBOUR TOWER g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0031	0.0036	0.0015	0.0035	0.0008	0.0004	0.0014	0.0008	0.0008	0.0006	0.0056	0.0015	0.0039	0.0008	0.0014	0.0015	0.0027	0.0018
NICKEL	0.0003	0.0006	0.0004	0.0004	0.0010	0.0015	0.0027	0.0002	0.0003	0.0002	0.0031	0.0003	0.0007	0.0008	0.0003	0.0003	0.0003	0.0009
LEAD	0.0024	0.0033	0.0010	0.0023	0.0000	0.0011	0.0007	0.0000	0.0021	0.0000	0.0035	0.0000	0.0020	0.0000	0.0018	0.0014	0.0027	0.0014
ZINC	0.2700	0.5000	0.2400	1.0000	0.0051	0.0400	0.0099	0.2700	0.5300	0.1900	0.0000	0.0590	0.0000	0.0210	0.0290	0.4200	0.0000	0.3183
IRON	0.1300	0.1800	0.3100	0.3900	0.3600	0.3300	0.6100	0.4500	0.4100	0.5500	0.7200	0.2100	0.6100	0.0620	0.3100	0.1100	0.4500	0.3522
MANGANESE	0.0090	0.0140	0.0230	0.0140	0.0120	0.0180	0.0240	0.0160	0.0320	0.0220	0.0340	0.0150	0.0250	0.0033	0.0190	0.0100	0.0440	0.0180
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0010	0.0008	0.0009	0.0008	0.0000	0.0020	0.0010	0.0010	0.0016	0.0013	0.0013	0.0008	0.0012	0.0000	0.0009	0.0008	0.0015	0.0010
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TITANIUM	0.0024	0.0045	0.0059	0.0042	0.0050	0.0003	0.0059	0.0045	0.0066	0.0044	0.0085	0.0027	0.0053	0.0009	0.0023	0.0015	0.0072	0.0044
VANADIUM	0.0004	0.0007	0.0006	0.0000	0.0004	0.0009	0.0016	0.0005	0.0009	0.0009	0.0073	0.0006	0.0010	0.0003	0.0007	0.0004	0.0009	0.0007
TOTAL LOADING	6.0	17.0 ---	7.5 ---	17.0 ---	2.6	2.7	5.2	4.2	5.2	9.8 ---	19.0 ---	5.8	15.0 ---	1.3	7.2 ---	3.4	21.0 ---	

TABLE 4g

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29543 - DOFASCO #4 GALV LINE g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0021	0.0019	0.0013	0.0011	0.0012	0.0019	0.0018	0.0022	0.0017	0.0028	0.0027	0.0023	0.0023	0.0018	0.0033	0.0017	0.0025	0.0020
NICKEL	0.0007	0.0004	0.0004	0.0009	0.0003	0.0034	0.0042	0.0014	0.0012	0.0009	0.0011	0.0004	0.0009	0.0003	0.0011	0.0005	0.0006	0.0011
LEAD	0.0017	0.0012	0.0000	0.0009	0.0014	0.0021	0.0018	0.0025	0.0040	0.0019	0.0036	0.0017	0.0022	0.0006	0.0027	0.0061	0.0000	0.0020
ZINC	0.1100	0.1100	0.0300	0.1000	0.0500	0.0730	0.0660	0.0850	0.0800	0.0560	0.0930	0.0059	0.1300	0.1700	0.3800	0.1700	0.5200	0.1311
IRON	0.4700	0.3400	0.8400	0.2500	0.3500	0.6300	0.7700	0.8300	0.9600	0.6300	0.6300	0.6800	0.4300	0.2000	0.8900	0.3600	0.5600	0.5776
MANGANESE	0.0300	0.0260	0.0250	0.0140	0.0160	0.0370	0.0400	0.0410	0.0510	0.0320	0.0370	0.0410	0.0250	0.0150	0.0000	0.0290	0.0420	0.0295
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0017	0.0015	0.0021	0.0012	0.0009	0.0021	0.0018	0.0023	0.0027	0.0017	0.0017	0.0017	0.0018	0.0015	0.0026	0.0016	0.0026	0.0017
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0002	0.0002	0.0002	0.0000	0.0002	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0092	0.0000	0.0006
TITANIUM	0.0096	0.0062	0.0074	0.0030	0.0039	0.0084	0.0100	0.0100	0.0110	0.0066	0.0080	0.0098	0.0058	0.0041	0.0012	0.0093	0.0110	0.0077
VANADIUM	0.0017	0.0012	0.0009	0.0017	0.0011	0.0016	0.0021	0.0015	0.0011	0.0014	0.0015	0.0013	0.0008	0.0016	0.0020	0.0012	0.0011	0.0014
TOTAL LOADING	9.4	6.9	12.0	5.5	4.0	6.0	5.0	9.4	9.2	7.6	9.7	7.8	7.3	2.1	15.0	5.8	8.1	

TABLE 4h

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29545 - DOFASCO QUALITY TRAIN. CNTR. g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0024	0.0017	0.0016	0.0012	0.0011	0.0019	0.0013	0.0013	0.0016	0.0018	0.0017	0.0029	0.0024	0.0021	0.0020	0.0031	0.0020	0.0019
NICKEL	0.0019	0.0006	0.0015	0.0006	0.0004	0.0003	0.0006	0.0005	0.0005	0.0008	0.0008	0.0004	0.0003	0.0006	0.0004	0.0007	0.0007	0.0007
LEAD	0.0011	0.0029	0.0000	0.0011	0.0010	0.0020	0.0012	0.0018	0.0020	0.0011	0.0013	0.0015	0.0008	0.0017	0.0012	0.0009	0.0019	0.0014
ZINC	0.0150	0.0290	0.0140	0.0100	0.0088	0.0200	0.0120	0.0140	0.0190	0.0180	0.0180	0.0170	0.0120	0.0240	0.0200	0.0330	0.0170	0.0177
IRON	0.4900	0.2900	0.3000	0.4600	0.2700	0.7500	0.6300	0.3900	0.4200	0.5100	0.5500	0.3900	0.1000	0.8300	0.3400	0.5200	0.5800	0.4600
MANGANESE	0.0230	0.0230	0.0150	0.0200	0.0150	0.0410	0.0350	0.0290	0.0220	0.0260	0.0360	0.0280	0.0093	0.0000	0.0200	0.0300	0.0290	0.0236
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0015	0.0012	0.0012	0.0013	0.0006	0.0010	0.0020	0.0013	0.0015	0.0013	0.0015	0.0014	0.0005	0.0018	0.0012	0.0017	0.0015	0.0013
LITHIUM	0.0000	0.0014	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000	0.0000	0.0001
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000
TITANIUM	0.0064	0.0085	0.0053	0.0060	0.0051	0.0015	0.0110	0.0078	0.0059	0.0021	0.0120	0.0081	0.0023	0.0023	0.0064	0.0082	0.0120	0.0065
VANADIUM	0.0008	0.0012	0.0005	0.0000	0.0000	0.0012	0.0018	0.0009	0.0005	0.0006	0.0012	0.0010	0.0007	0.0014	0.0017	0.0011	0.0020	0.0010
TOTAL LOADING	10.0	7.7	4.2	9.2	2.9	6.6	6.1	6.6	3.6	6.8	7.4	4.1	5.0	16.0	7.0	7.1	4.7	

TABLE 4i

SEMI-QUANTITATIVE ANALYSIS OF DUSTFALL SAMPLES

29547 - BEACH STRIP PIER 25 g/sq m/30 days

	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11	08/11	15/11	AVG
COPPER	0.0046	0.0015	0.0017	0.0013	0.0015	0.0023	0.0015	0.0006	0.0005	0.0013	0.0000	0.0017	0.0032	0.0009	0.0014	0.0022	0.0017	0.0016
NICKEL	0.0013	0.0003	0.0005	0.0003	0.0002	0.0012	0.0000	0.0002	0.0000	0.0003	0.0000	0.0002	0.0008	0.0000	0.0003	0.0003	0.0003	0.0004
LEAD	0.0020	0.0006	0.0005	0.0006	0.0005	0.0008	0.0006	0.0009	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0006	0.0006	0.0005	0.0005
ZINC	0.0130	0.0140	0.0120	0.0200	0.0069	0.0100	0.0046	0.0140	0.0120	0.0170	0.0000	0.0100	0.0330	0.0062	0.0130	0.0250	0.0300	0.0142
IRON	0.2600	0.1100	0.2100	0.1600	0.1200	0.2800	0.2600	0.1300	0.1600	0.1500	0.1400	0.1400	0.7000	0.0320	0.0880	0.0650	0.0600	0.1803
MANGANESE	0.0099	0.0083	0.0120	0.0100	0.0084	0.0200	0.0150	0.0100	0.0140	0.0100	0.0000	0.0200	0.0520	0.0022	0.0055	0.0059	0.0087	0.0125
ARSENIC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BERYLLIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHROMIUM	0.0016	0.0007	0.0010	0.0007	0.0000	0.0031	0.0006	0.0006	0.0008	0.0008	0.0000	0.0011	0.0020	0.0000	0.0000	0.0008	0.0008	0.0009
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TITANIUM	0.0031	0.0062	0.0040	0.0029	0.0025	0.0052	0.0045	0.0033	0.0026	0.0030	0.0000	0.0032	0.0098	0.0006	0.0009	0.0013	0.0020	0.0032
VANADIUM	0.0008	0.0012	0.0010	0.0005	0.0011	0.0011	0.0014	0.0005	0.0003	0.0013	0.0000	0.0014	0.0009	0.0009	0.0008	0.0000	0.0007	0.0008
TOTAL LOADING	5.1	4.2	4.0	4.2	3.4	5.0	2.2	2.2	8.5	2.3	2.5	3.3	8.9	1.8	2.1	1.8	1.9	

TABLE 5

COMPARISON OF WEEKLY DUSTFALL TO NEARBY NETWORK STATIONS

g/sq m/30 days

	WEEK STARTING 02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10	01/11
STELCO OFFICE														
29539	8.3	7.9	8.3	2.0	3.4	3.7	5.9	2.0	13.0	6.8	5.3	7.5	3.3	3.8
	---	---	---						---			---		
1 mo avg					6.0				6.2					5.3
29011 REGULAR NETWORK					5.9				6.6					4.9
DOFASCO QUALITY CTR														
29545	7.7	4.2	9.2	2.9	6.6	6.1	6.6	3.6	6.8	7.4	4.1	5.0	16.0	7.0
	---		---							---			---	
1 mo avg					6.1				5.8					7.9
29010 REGULAR NETWORK					8.5				7.3					10.8
BEACH PIER 25														
29547	4.2	4.0	4.2	3.4	5.0	2.2	2.2	8.5	2.3	2.5	3.3	8.9	1.8	2.1
								---				---		
1 mo avg					4.2				3.8					3.7
29044 REGULAR NETWORK					3.4				4.1					6.4
29102 REGULAR NETWORK					4.2				3.0					3.6

TABLE 6

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

RAIN DAYS

1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	J I Case 29531 TSP	FreeC	TotalC	Stelco Crane 29533 TSP	FreeC	TotalC	Stelco Chem 29535 TSP	FreeC	TotalC	Stelco Filt 29537 TSP	FreeC	TotalC	Stelco Office 29539 TSP	FreeC	TotalC	Dofasco Harbour 29541 TSP	FreeC	TotalC
JUL 29	0	0	3	1	3	0	0	0	5	0	5	43	2.9	7.7	75	4.3	8.8	29	2.4	8.5	79	4.8	11.8	56	3.6	8.1	50	3.3	8.3
OCT 6	0	0	0	0	2	8	2	0	0	3	14	22	1.6	4.8	170	10.6	19.6	70	6.8	11.7	68	2.5	7.2	44	1.8	4.8	184	22.9	36.8
24	0	0	0	0	5	7	0	0	0	0	13	34	0.7	4.2	71	2.8	7.2	80	4.0	9.1	75	2.2	8.3	62	2.7	5.0	108	19.7	24.3
NOV 20	0	0	0	0	2	5	2	3	0	4	15				32	1.0	2.2	18	2.5	3.5							16	0.6	2.2
											n	3	3	3	4	4	4	4	4	4	3	3	3	3	3	3	4	4	4
											Geo Mean	32	1.5	5.4	73	3.4	7.2	41	3.6	7.5	74	3.0	8.9	53	2.6	5.8	63	5.5	11.3
											Max	43	2.9	7.7	170	10.6	19.6	80	6.8	11.7	79	4.8	11.8	62	3.6	8.1	184	22.9	36.8

1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	Dofasco Galv 29543 TSP	FreeC	TotalC	Dofasco Qual Ctr 29545 TSP	FreeC	TotalC	Beach Pier 25 29547 TSP	FreeC	TotalC	Strathearn 29555 TSP	FreeC	TotalC	Philips 29557 TSP	FreeC	TotalC
JUL 29	0	0	3	1	3	0	0	0	5	0	5	42	2.9	7.2	61	5.3	9.8	41	2.0	6.7	40	2.1	6.6	44	1.8	6.6
OCT 6	0	0	0	0	2	8	2	0	0	3	14	92	15.8	28.2	51	1.1	6.0	50	5.0	9.6	32	0.6	3.7	73	21.4	26.1
24	0	0	0	0	5	7	0	0	0	0	13	91	3.0	7.4	61	2.6	6.7	47	3.2	5.5	45	2.1	4.9	54	2.7	6.6
NOV 20	0	0	0	0	2	5	2	3	0	4	15	31	6.6	9.2	30	5.2	7.2				11	0.7	1.8			
											n	4	4	4	4	4	4	3	3	3	4	4	4	3	3	3
											Geo Mean	57	5.5	10.8	49	3.0	7.3	46	3.2	7.1	28	1.2	3.8	56	4.7	10.4
											Max	92	15.8	28.2	61	5.3	9.8	50	5.0	9.6	45	2.1	6.6	73	21.4	26.1

TABLE 7a

CORRELATION COEFFICIENTS *

Hours of Wind Direction vs TSP & Elements

Jul - No. 1981 Survey of Hamilton Industrial Zone

28581 - J.I.CASE

	ALL DATA						DAYS ONLY					
	TSP	Fe	Mn	FC	TC	CO3	TSP	Fe	Mn	FC	TC	CO3
N	0.05	0.08	-0.01	0.15	0.05	-0.02	0.15	0.25	-0.01	0.16	0.21	0.16
NE	0.26 --	0.43 --	0.23 --	0.50 --	0.29 --	0.20	0.34 --	0.59 --	0.39 --	1.69 --	0.41 --	0.29 --
E	0.21	0.43 --	0.27 --	0.18	0.15	0.18	0.14	0.43 --	0.14	0.10	0.05	0.06
SE	-0.06	-0.06	-0.13	-0.02	-0.06	-0.12	-0.15	-0.14	-0.22	-0.04	-0.11	-0.23
S	-0.16	-0.26	-0.16	-0.19	-0.16	-0.12	-0.46	-0.40	-0.44	-0.37	-0.45	-0.46
SW	-0.10	-0.35	-0.12	-0.40	-0.23	-0.07	-0.07	-0.36	-0.15	-0.33	-0.11	0.00
W	-0.29	-0.39	-0.31	-0.41	-0.29	0.05	-0.16	-0.42	-0.23	-0.36	-0.16	-0.08
NW	-0.10	-0.06	-0.09	-0.09	-0.01	-0.05	-0.07	-0.02	-0.11	-0.05	0.04	-0.05
CALM	0.15	0.25	0.17	0.42 --	0.29 --	-0.12	0.09	0.16	0.30 --	0.31 --	0.12	0.01

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free(Elemental) Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7b

CORRELATION COEFFICIENTS - r

Hours of Wind Direction VS TSP & Elements

Jul - Nov 1991 Survey of Hamilton Industrial Zone

29533 - STELCO CRANE 5& RUNWAY

	ALL DATA						DAYS ONLY					
	TSP	Fe	Mn	FC	TC	CO3	TSP	Fe	Mn	FC	TC	CO3
N	-0.28	-0.29	-0.26	-0.25	-0.24	-0.26	-0.37	-0.41	-0.37	-0.32	-0.32	-0.31
NE	-0.36	-0.41	-0.34	-0.34	-0.34	-0.20	-0.34	-0.41	-0.34	-0.34	-0.35	-0.21
E	-0.33	-0.40	-0.35	-0.27	-0.29	-0.32	-0.04	-0.55	-0.50	-0.40	-0.43	-0.53
SE	-0.12	-0.01	-0.14	-0.07	-0.07	-0.14	-0.15	0.00	-0.20	-0.09	-0.10	-0.23
S	-0.04	-0.04	-0.07	-0.12	-0.07	-0.06	0.06	0.24	0.06	0.11	0.11	0.06
SW	0.35 --	0.41 --	0.31 --	0.20	0.29 --	0.39 --	0.47 --	0.57 --	0.44 --	0.39 --	0.55 --	0.67 --
W	0.35 --	0.48 --	0.47 --	0.43 --	0.34 --	0.18	0.39 --	0.35 --	0.53 --	0.38 --	0.29 --	0.15
NW	-0.05	-0.16	-0.05	-0.16	-0.15	-0.14	-0.13	-0.31	-0.13	-0.20	-0.21	-0.27
CALM	-0.06	-0.12	-0.19	0.01	-0.02	-0.05	-0.29	-0.21	-0.48	-0.21	-0.19	-0.23

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free(Elemental) Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7c

CORRELATION COEFFICIENTS

Hours of Wind Direction vs TSP & Elements

[1] - Nov. 1981 Survey of Hamilton Industrial Zone

[2] - STELCO OMEM LAB

	ALL DATA						24-H SAM.					
	TSP	Fe	Mn	Fl	Tl	[2]	TSP	Fe	Mn	Fl	Tl	[2]
N	0.06	0.01	0.15	-0.18	-0.18	0.17	-0.01	-0.18	-0.13	-0.17	-0.15	0.11
NE	-0.16	-0.04	0.12	-0.11	-0.17	0.27 **	-0.19	-0.13	0.05	-0.14	-0.21	0.35 **
E	0.09	0.19	0.19	-0.04	0.11	0.21	0.01	-0.11	-0.11	-0.17	-0.13	0.14
SE	-0.23	0.02	-0.18	-0.16	-0.15	-0.19	-0.21	-0.14	-0.19	-0.16	-0.24	-0.29
S	-0.15	-0.02	-0.17	-0.11	-0.11	-0.19	-0.14	-0.13	-0.33	-0.32	-0.32	-0.40
SW	-0.11	-0.15	-0.15	-0.21	-0.14	-0.19	0.03	-0.10	-0.13	-0.20	-0.05	-0.01
W	0.12	0.01	0.21	0.17	0.14	-0.15	0.29 **	0.37 **	0.34 **	0.53 **	0.44 **	-0.11
NW	0.17	0.37 **	0.11	0.49 **	0.31 **	0.17	0.14	0.41 **	0.11	0.49 **	0.26 **	0.00
CALM	0.11	0.01	-0.09	0.31 **	0.19 **	0.12	-0.13	-0.13	-0.12	-0.24	-0.11	0.01

TSP - Total Suspended Particulate

Fe - Iron

Mn - Manganese

Fl - Free Elemental Iodine

Tl - Total Iodine

[2] - Carbonate

TABLE 7d

[illegible] COEFFICIENTS [illegible]

Hours of wind direction x TSP & Elements

Jul - Aug. 1991 Survey of Hamilton Industrial Zone

[illegible] - [illegible] [illegible]

	ALL DATA						DAYS ONLY					
	TSP	Fe	Mn	EC	TC	COD	TSP	Fe	Mn	EC	TC	COD
N	-0.04	0.01	-0.21	-0.05	0.01	0.05	0.14	0.03	-0.01	**0.53**	**0.46**	0.05
NE	-0.01	**0.34**	-0.14	-0.03	-0.17	0.03	-0.01	**0.54**	-0.15	0.09	-0.11	-0.01
E	**0.31**	0.24	0.15	0.11	0.1	**0.30**	**0.33**	0.23	0.11	**0.46**	**0.49**	0.24
SE	-0.16	-0.02	-0.17	-0.12	-0.12	-0.21	-0.17	-0.06	-0.31	-0.12	-0.10	-0.34
S	-0.17	-0.05	-0.14	-0.21	-0.19	-0.19	-0.50	-0.47	-0.47	-0.51	-0.49	-0.35
SW	-0.23	-0.47	-0.12	-0.42	-0.33	-0.13	-0.15	-0.53	0.00	-0.40	-0.24	0.07
W	-0.11	-0.17	-0.15	-0.11	-0.11	-0.17	0.16	0.06	0.21	0.11	0.11	-0.05
NW	0.19	0.20	0.15	0.23	0.21	0.13	0.20	0.32	0.15	**0.54**	**0.41**	0.01
CALM	0.14	0.21	0.21	**0.45**	**0.38**	0.21	-0.06	0.03	-0.11	-0.13	-0.13	0.00

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

EC Free/Elemental Carbon

TC Total Carbon

COD Permanganate

TABLE 7e

CORRELATION COEFFICIENTS - r

Hours of Wind Direction VS TSP & Elements

Jul - Oct. 1991 Survey of Hamilton Industrial Zone

1988 - STELCO GENERAL OFFICE

	ALL DATA						HIGH ONLY					
	TSP	Fe	Mn	FC	TC	CO3	TSP	Fe	Mn	FC	TC	CO3
N	-0.03	0.11	0.06	-0.04	-0.11	0.11	-0.01	0.24	0.03	0.17	-0.03	-0.03
NE	-0.35	0.17	0.37 --	0.06	-0.07	0.12	-0.06	-0.05	0.51 --	-0.12	-0.14	0.13
E	0.07	0.15	0.07	0.26 --	0.14	0.08	0.00	-0.09	-0.11	0.21	0.01	-0.12
SE	-0.13	-0.12	-0.11	-0.07	-0.09	-0.14	-0.21	-0.09	-0.19	-0.11	-0.15	-0.31
S	-0.11	0.03	-0.13	-0.21	-0.16	-0.26	-0.17	-0.35	-0.31	-0.39	-0.17	-0.31
SW	0.01	-0.21	-0.17	-0.43	-0.23	0.01	0.16	-0.21	-0.16	-0.42	-0.15	0.13
W	-0.06	-0.11	-0.13	0.11	-0.06	-0.07	0.17	0.17	0.11	0.26 --	0.28	0.07
NW	0.12	0.15	0.13	0.34 --	0.41 --	0.07	0.11	0.33 --	-0.05	0.72 --	0.56 --	0.16
CALM	0.11	0.04	0.05	0.12	0.23	-0.05	-0.14	-0.13	0.08	-0.12	-0.19	-0.27

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free(Elemental) Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7f

CORRELATION COEFFICIENTS *

Hours of Wind Direction VS TSP & Elements

1.1 - Nov 1991 Survey of Hamilton Industrial Zone

2954: - DOFASCO HARBOUR SHORE

	ALL DATA						DAYS ONLY					
	TSP	Fe	Mn	FC	TC	CO3	TSP	Fe	Mn	FC	TC	CO2
N	-0.17	-0.17	-0.23	-0.12	-0.11	-0.10	-0.22	-0.23	-0.31	-0.16	-0.18	-0.19
NE	-0.23	-0.30	-0.30	-0.17	-0.15	-0.13	-0.25	-0.35	-0.27	-0.24	-0.21	-0.21
E	-0.25	-0.31	-0.30	-0.24	-0.14	-0.21	-0.35	-0.44	-0.46	-0.31	-0.33	-0.31
SE	-0.11	-0.13	-0.14	-0.11	-0.10	-0.09	-0.14	-0.17	-0.21	-0.13	-0.12	-0.13
S	-0.05	0.06	-0.10	0.03	0.00	-0.09	-0.11	0.05	-0.11	-0.01	-0.06	-0.11
SW	0.50 --	0.41 --	0.26 --	0.54 --	0.49 --	0.36 --	0.71 --	0.68 --	0.59 --	0.76 --	0.72 --	0.67 --
W	0.04	0.14	0.32 --	-0.03	0.00	0.01	0.06	0.10	0.34 --	-0.07	-0.01	0.03
NW	-0.21	-0.22	-0.12	-0.21	-0.19	-0.15	-0.29	-0.32	-0.25	-0.28	-0.27	-0.27
CALM	-0.08	0.02	0.02	-0.06	-0.04	0.06	-0.23	-0.21	-0.26	-0.25	-0.24	-0.21

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free/Elemental Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7g

CORRELATION COEFFICIENTS

Hours of Wind Direction VS TSP & Elements

Jul - Nov 1991 Survey of Hamilton Industrial Zone

29543 - DOFASCO #4 GALVANIZING

	ALL DATA						DAYS ONLY					
	TSP	Fe	Mn	FC	TC	CO3	TSP	Fe	Mn	FC	TC	CO3
N	-0.19	-0.23	-0.05	-0.32	-0.29	0.01	-0.11	-0.26	-0.07	-0.31	-0.29	0.01
NE	-0.27	-0.23	-0.14	-0.32	-0.34	-0.11	-0.26	-0.25	-0.20	-0.30	-0.32	-0.17
E	-0.11	-0.15	-0.13	-0.30	-0.29	0.05	-0.30	-0.51	-0.29	-0.41	-0.41	-0.02
SE	-0.19	-0.19	-0.24	-0.19	-0.17	-0.16	-0.13	-0.17	-0.35	-0.17	-0.15	-0.26
S	-0.26	-0.29	-0.36	-0.33	-0.30	-0.34	-0.23	-0.20	-0.31	-0.29	-0.24	-0.40
SW	0.07	0.00	-0.08	0.08	0.14	-0.10	0.24	0.14	0.08	0.13	0.25	0.16
W	0.49 --	0.46 --	0.40 --	0.57 --	0.54 --	0.16	0.54 --	0.67 --	0.62 --	0.74 --	0.65 --	0.38 --
NW	0.13	0.36 --	0.26 --	0.29 --	0.24	0.04	0.09	0.51 --	0.33 --	0.33 --	0.24	-0.04
CALM	0.03	0.03	0.01	-0.04	-0.07	0.16	-0.36	-0.45	-0.41	-0.40	-0.42	-0.28

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free(Elemental Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7h

CORRELATION COEFFICIENTS -

Hours of Wind Direction VS TSP & Elements

[illegible] - Nov. 1991 Survey of Hamilton Industrial Zone

1994F - IOPASSD QUALITY TRAINING

	ALL DATA						1HR ONLY					
	TSP	Fe	Mn	FC	TC	CO3	TSP	Fe	Mn	FC	TC	CO3
N	0.19	0.26	0.12	0.20	0.06	0.09	0.09	0.09	0.04	0.19	0.11	0.11
NE	0.18	0.46	0.18	0.32	0.21	0.18	0.21	0.58	0.21	0.56	0.37	0.17
E	0.32	0.35	0.40	0.38	0.18	0.35	0.34	0.38	0.40	0.55	0.37	0.32
SE	-0.13	-0.09	-0.13	-0.12	-0.07	0.00	-0.20	-0.16	-0.22	-0.04	-0.14	-0.07
S	-0.08	-0.18	-0.14	0.03	0.19	-0.23	-0.07	-0.35	-0.40	-0.07	-0.05	-0.05
SW	-0.09	-0.25	-0.14	-0.31	-0.15	-0.25	-0.03	-0.21	-0.17	-0.39	-0.16	-0.10
W	-0.20	-0.30	-0.16	-0.40	-0.21	-0.14	-0.21	-0.30	-0.14	-0.36	-0.30	-0.11
NW	-0.15	-0.17	-0.07	-0.05	-0.03	-0.14	-0.28	-0.13	-0.15	-0.20	0.25	-0.17
CALM	0.07	-0.04	0.03	0.21	0.19	0.22	0.11	-0.07	0.15	0.31	0.12	0.19

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free(Elemental) Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7i

CORRELATION COEFFICIENTS

Hours of Wind Direction VS TSP & Elements

Jul - Nov. 1991 Survey of Hamilton Industrial Zone

29547 - BEACH STRIP PIER 25

	ALL DATA						DAYS ONLY					
	TSP	Fe	Mn	EC	TC	CO3	TSP	Fe	Mn	EC	TC	CO3
N	-0.20	-0.23	-0.19	-0.25	-0.30	0.00	-0.41	-0.31	-0.41	-0.48	-0.44	-0.26
NE	-0.11	-0.22	-0.17	-0.33	-0.30	-0.06	-0.06	-0.13	0.01	-0.13	-0.17	-0.27
E	-0.13	-0.29	-0.21	-0.28	-0.21	-0.15	-0.24	-0.44	-0.39	-0.42	-0.35	-0.46
SE	-0.12	-0.11	-0.15	-0.14	-0.09	-0.06	-0.20	-0.16	-0.17	-0.24	-0.14	-0.24
S	-0.05	-0.19	-0.17	-0.15	-0.13	-0.13	-0.06	-0.05	-0.10	0.21	0.03	-0.04
SW	0.06	0.03	0.03	0.10	0.04	-0.10	0.17	0.06	0.25	0.28 --	0.27 --	0.36 --
W	0.27 --	0.42 --	0.40 --	0.38 --	0.34 --	0.08	0.29 --	0.55 --	0.45 --	0.40 --	0.38 --	0.59 --
NW	-0.12	0.11	-0.08	-0.07	-0.04	-0.08	-0.13	0.33 --	-0.16	-0.17	-0.12	-0.01
CALM	-0.01	0.01	0.01	0.11	0.13	0.26 --	-0.16	-0.41	-0.36	-0.41	-0.31	-0.61

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

EC Free(Elemental) Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7j

CORRELATION COEFFICIENTS -

Hours of Wind Direction vs TSP & Elements

Jul - Aug. 1981 Survey of Hamilton Industrial Zone

DUNDAS - STRATHEARN/BURLINGTON

	ALL DATA						DAYS ONLY					
	TSP	Fe	Mn	FC	TC	CO3	TSP	Fe	Mn	FC	TC	CO3
N	-0.03	-0.11	-0.03	-0.15	-0.11	-0.01	0.15	0.21	0.11	0.01	0.17	0.15
NE	0.04	-0.03	0.06	-0.04	-0.01	0.10	0.11	0.05	0.12	0.07	0.13	0.15
E	0.34 --	0.39 --	0.21	0.36 --	0.20	0.26 --	0.26 --	0.29 --	0.16	0.25 --	0.11	0.17
SE	-0.11	-0.15	-0.13	-0.06	-0.07	-0.10	-0.15	-0.23	-0.26	-0.15	-0.13	-0.17
S	-0.12	-0.19	-0.13	-0.02	0.01	-0.15	-0.30	-0.24	-0.15	-0.31	-0.27	-0.31
SW	-0.07	-0.15	-0.01	-0.11	-0.06	-0.02	-0.07	-0.15	0.05	-0.10	0.01	0.05
W	-0.12	0.01	-0.02	-0.16	-0.21	-0.12	-0.05	0.01	-0.05	-0.11	-0.09	-0.13
NW	-0.05	0.23	-0.01	0.13	0.01	-0.07	-0.11	0.15	-0.11	-0.04	-0.07	-0.11
CALM	0.07	0.01	0.06	0.17	0.21	0.07	0.01	-0.11	-0.05	0.13	0.05	0.11

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free(Elemental) Carbon

TC Total Carbon

CO3 Carbonate

TABLE 7k

CORRELATION COEFFICIENTS -

Hours of Wind Direction VS TSP & Elements

July - Nov. 1971 Survey of Hamilton Industrial Zone

1955T - FARRDALE N. PHILIPS PGO MILL

	ALL DATA						24-HR ONLY					
	TSP	Fe	Mn	FI	TC	CO3	TSP	Fe	Mn	FC	TC	CO3
N	-0.26	-0.23	-0.21	-0.15	-0.32	0.05	-0.20	-0.19	-0.13	-0.32	-0.35	-0.26
NE	-0.23	-0.15	-0.08	-0.32	-0.34	0.08	-0.16	-0.10	-0.02	-0.28	-0.30	0.00
E	0.06	-0.04	0.21	-0.11	-0.25	-0.08	-0.05	-0.15	0.18	-0.46	-0.45	-0.26
SE	-0.11	-0.14	-0.16	-0.14	-0.12	-0.12	-0.20	-0.23	-0.24	-0.20	-0.18	-0.23
S	-0.11	-0.14	-0.14	-0.13	-0.16	-0.14	-0.16	-0.20	-0.26	0.10	-0.03	-0.15
SW	0.26 --	0.07	0.04	(0.56 --)	(0.53 --)	0.06	(0.35 --)	0.26 --	0.11	(0.58 --)	(0.62 --)	(0.46 --)
W	0.03	-0.05	-0.17	(0.31 --)	0.27 --	-0.13	0.06	-0.03	-0.13	0.27 --	0.23 --	-0.03
NW	-0.07	0.21	0.31	-0.15	-0.13	-0.17	-0.14	(0.33 --)	0.11	-0.19	-0.21	-0.26
CALM	0.11	0.19	0.14	-0.13	-0.11	0.17	-0.13	-0.07	0.01	-0.36	-0.31	-0.04

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FI Free-Elemental Carbon

TC Total Carbon

CO3 Carbonate

TABLE 8

WEEKLY WIND FREQUENCY JULY 26 - NOVEMBER 22,1991

WEEK STARTING	N	NE	E	SE	S	SW	W	NW	CALM
26/07	6	12	31	3	4	34	41	13	22
02/08	6	37	25	0	0	4	23	27	46
09/08	0	4	21	0	1	30	37	20	50
16/08	6	22	28	2	4	49	35	10	9
23/08	10	15	27	5	1	70	17	0	21
30/08	13	28	30	6	3	31	19	12	26
06/09	17	9	31	2	3	29	11	11	54
13/09	4	4	20	0	0	46	40	14	37
20/09	7	15	11	6	17	38	35	14	24
27/09	7	10	7	2	2	43	40	7	47
04/10	5	6	2	1	11	86	21	8	26
11/10	14	1	9	2	10	60	17	12	42
18/10	5	4	3	0	22	69	8	24	33
25/10	9	47	61	4	3	20	3	1	20
01/11	3	9	2	0	9	62	50	10	19
08/11	15	16	11	1	0	51	11	13	44
15/11	24	16	10	0	6	30	4	31	47
Total hrs	151	255	329	34	96	752	412	227	567
Percent	5.3	9.0	11.7	1.2	3.4	26.6	14.6	8.0	20.1

TABLE 9

CORRELATION COEFFICIENTS (r)

Hours of Wind Direction VS DUSTFALL & Elements

Jul - Nov 1991 Survey of Hamilton Industrial Zone

	29531 - J.I.CASE				29533 STELCO CRANE RUNWAY				29535 STELCO CHEM LAB				29537 STELCO EAST FILT				29539 STELCO OFFICE			
	TOTAL DUSTFALL	Fe	Mn	Zn	TOTAL DUSTFALL	Fe	Mn	Zn	TOTAL DUSTFALL	Fe	Mn	Zn	TOTAL DUSTFALL	Fe	Mn	Zn	TOTAL DUSTFALL	Fe	Mn	Zn
N	-0.17	0.36	0.09	0.29	-0.57	0.18	-0.30	-0.43	-0.46	0.14	0.10	-0.17	-0.16	0.51	-0.07	-0.03	-0.38	0.24	0.08	-0.19
NE	0.45	0.75	0.02	0.11	-0.39	-0.25	-0.12	-0.29	-0.28	-0.24	-0.01	-0.40	0.07	-0.02	-0.30	-0.35	-0.17	-0.07	-0.17	0.17
E	0.42	0.70	-0.19	-0.14	-0.37	-0.46	0.03	-0.22	-0.01	-0.12	0.14	-0.54	0.13	0.15	-0.10	-0.65	-0.27	-0.22	-0.42	-0.18
SE	-0.27	0.02	0.12	-0.34	-0.42	0.17	0.52	0.07	-0.34	-0.06	0.47	-0.31	-0.34	0.16	0.12	-0.54	-0.50	-0.10	-0.10	-0.30
S	-0.34	-0.34	0.73	0.47	0.28	0.50	0.37	0.58	-0.34	-0.23	0.22	0.00	-0.35	-0.11	0.06	0.59	-0.11	-0.06	0.22	-0.08
SW	-0.45	-0.60	0.19	0.03	0.11	0.41	0.10	0.37	-0.25	-0.14	-0.24	0.40	-0.49	-0.47	-0.03	0.33	-0.02	-0.06	0.10	-0.32
W	0.03	-0.50	-0.42	-0.52	0.42	-0.16	0.03	-0.01	0.54	0.14	-0.11	0.34	0.20	-0.33	0.03	-0.10	0.31	-0.06	-0.07	0.02
NW	0.24	0.06	0.22	0.49	0.39	-0.09	-0.20	-0.09	0.14	-0.08	0.11	-0.19	0.49	0.33	-0.05	0.47	0.20	0.07	0.18	0.48
CALM	-0.10	0.00	-0.10	0.03	0.05	0.02	-0.06	-0.04	0.34	0.49	0.10	0.14	0.31	0.58	0.42	0.17	0.31	0.38	0.35	0.42

Fe - Iron

Mn - Manganese

Zn - Zinc

TABLE 9 (cont'd)

CORRELATION COEFFICIENTS (r)

Hours of Wind Direction VS DUSTFALL & Elements

Jul - Nov 1991 Survey of Hamilton Industrial Zone

	29541 - DOFASCO HARBOUR				29543 DOFASCO GALVANIZING				29545 DOFASCO QUALITY CTR				29547 BEACH PIER 25			
	TOTAL DUSTFALL	Fe	Mn	Zn	TOTAL DUSTFALL	Fe	Mn	Zn	TOTAL DUSTFALL	Fe	Mn	Zn	TOTAL DUSTFALL	Fe	Mn	Zn
N	0.03	-0.03	0.26	-0.26	-0.46	-0.16	0.40	0.39	-0.13	0.47	0.40	0.14	-0.30	-0.20	-0.03	0.21
NE	-0.07	-0.52	-0.40	0.21	-0.58	-0.60	-0.27	0.13	0.66	0.50	-0.29	0.49	-0.09	-0.33	-0.31	-0.11
E	-0.42	-0.50	-0.60	0.08	-0.63	-0.47	-0.20	-0.19	0.66	0.53	-0.35	0.02	-0.16	-0.20	-0.25	-0.36
SE	-0.54	-0.18	-0.22	0.01	-0.45	-0.06	0.17	-0.35	0.06	0.42	0.01	-0.08	0.30	-0.07	-0.06	-0.41
S	0.28	0.41	0.46	-0.16	0.25	0.24	0.16	0.09	-0.26	-0.34	-0.17	-0.21	0.68	0.58	0.62	0.24
SW	0.10	0.46	0.17	-0.24	0.23	0.10	-0.13	-0.07	-0.33	-0.35	0.07	-0.35	0.05	0.22	0.17	-0.02
W	-0.08	0.01	-0.09	0.38	0.69	0.49	-0.19	-0.14	-0.08	-0.29	0.06	-0.18	0.07	-0.12	-0.23	-0.15
NW	0.59	0.08	0.50	0.10	0.30	0.13	0.30	0.39	-0.33	-0.35	0.13	0.14	0.29	0.29	0.37	0.63
CALM	0.09	0.14	0.30	-0.24	0.04	0.27	0.46	-0.03	-0.37	-0.07	0.31	0.20	-0.25	0.02	0.11	0.18

Fe - Iron

Mn - Manganese

Zn - Zinc

TABLE 10

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

SW WIND DAYS

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29531 - J.I. Case Plant TSP	Fe	Mn	FreeC	TotalC	CO3	29539 Stelco - General Office TSP	Fe	Mn	FreeC	TotalC	CO3	29537 Stelco - East Side Filtration Plan TSP	Fe	Mn	FreeC	TotalC	CO3
	AUG 16	0	0	0	0	4	8	0	0	0	5	18							157	8.6	0.32	4.3	18.1	1.6	183	19.6	0.76	11.2	24.3	2.0
N	19	0	0	0	0	6	6	0	0	0	1	14							77	11.8	0.20	3.8	8.0	0.2	126	28.8	0.43	8.2	16.9	0.8
	22	0	0	0	0	0	11	1	0	0	0	12	75	2.4	0.28	2.8	12.3	0.7	144	5.4	0.38	4.3	16.2	2.6	160	9.7	0.58	10.0	19.2	2.8
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	40	0.9	0.10	1.2	5.9	0.0	106	2.0	0.12	4.7	10.0	0.0	120	11.8	0.39	5.9	15.2	0.7
N	9	0	0	0	0	2	8	0	0	2	0	6	76	2.2	0.34	2.2	8.9	0.0	120	4.2	0.28	3.6	11.3	0.3	127	8.0	0.41	3.8	11.9	1.0
N	15	0	0	0	0	0	6	3	0	3	0	7	65	2.6	0.10	1.1	10.0	0.0	100	3.1	0.15	2.0	10.1	0.0	107	8.5	0.36	5.7	15.0	0.5
	18	0	0	0	0	0	9	0	0	3	0	9	123	5.1	0.94	3.6	16.8	1.7	170	8.5	0.47	3.5	16.7	2.8	182	12.8	0.97	6.1	21.1	4.7
N	21	0	0	0	0	3	3	0	0	6	0	4	40	0.8	0.16	2.1	10.4	0.0	57	2.9	0.13	4.5	9.7	0.2	137	17.2	0.54	10.1	20.5	2.5
N	OCT 21	0	0	0	0	0	10	0	0	2	0	9	27	0.9	0.24	0.8	3.8	0.0	46	1.6	0.11	1.1	3.9	0.0	59	5.6	0.29	2.9	7.8	0.6
N	NOV 12	0	0	0	0	0	9	3	0	0	0	11	14	0.2	0.03	1.0	2.4	0.0	37	0.2	0.02	1.2	3.9	0.0						
											n		8	8	8	8	8	8	10	10	10	10	10	10	9	9	9	9	9	9
											Geo Mean		48	1.3	0.18	1.6	7.5	0.1	90	3.2	0.17	2.9	9.6	0.2	127	12.1	0.49	6.5	16.1	1.3
											Max		123	5.1	0.94	3.6	16.8	1.7	170	11.8	0.47	4.7	18.1	2.8	183	28.8	0.97	11.2	24.3	4.7

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29533 Stelco - Crane 56 Runway TSP	Fe	Mn	FreeC	TotalC	CO3	29535 Stelco - Chem Lab TSP	Fe	Mn	FreeC	TotalC	CO3
	AUG 16	0	0	0	0	4	8	0	0	0	5	18	367	24.3	2.50	16.6	32.6	3.7	212	22.3	0.93	17.3	34.4	1.6
N	19	0	0	0	0	6	6	0	0	0	1	14	19	0.4	0.05	0.4	3.7	0.0	107	13.1	0.47	4.2	10.7	1.4
	22	0	0	0	0	0	11	1	0	0	0	12	205	13.4	1.13	5.2	19.9	3.3	182	16.8	0.75	6.7	23.6	3.0
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	232	16.3	2.13	8.9	17.2	1.6	143	13.1	0.51	8.9	22.5	0.9
N	9	0	0	0	0	2	8	0	0	2	0	6	223	12.9	0.72	7.3	15.9	1.3	148	13.0	0.49	4.4	12.2	0.9
N	15	0	0	0	0	0	6	3	0	3	0	7	136	8.9	0.83	8.7	15.8	0.2	111	6.3	0.36	5.8	14.8	0.4
	18	0	0	0	0	0	9	0	0	3	0	9	261	19.4	1.48	11.5	22.8	4.4	242	25.4	0.95	11.3	25.8	5.3
N	21	0	0	0	0	3	3	0	0	6	0	4	163	13.8	1.10	5.3	11.6	0.8	144	13.6	0.57	13.2	24.1	2.6
N	OCT 21	0	0	0	0	0	10	0	0	2	0	9	108	9.4	0.64	6.6	12.0	1.4	61	4.3	0.22	5.6	10.7	0.6
N	NOV 12	0	0	0	0	0	9	3	0	0	0	11	99	12.9	0.85	5.8	8.2	0.3	27	1.4	0.05	1.1	2.3	0.0
											n		10	10	10	10	10	10	10	10	10	10	10	10
											Geo Mean		147	9.8	0.83	5.8	13.9	0.9	119	10.1	0.42	6.3	14.9	1.0
											Max		367	24.3	2.5	16.6	32.6	4.4	242	25.4	0.95	17.3	34.4	5.3

TABLE 11

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

SW WIND DAYS

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29547 Beach Strip Pier 25 TSP	Fe	Mn	FreeC	TotalC	CO3	29541 Dofasco - Harbour Shore TSP	Fe	Mn	FreeC	TotalC	CO3
	AUG 16	0	0	0	0	4	8	0	0	0	5	18	120	8.0	0.37	6.6	16.8	0.4	262	31.9	0.84	14.5	35.7	0.8
N	19	0	0	0	0	6	6	0	0	0	1	14	30	0.5	0.03	1.6	3.8	0.0	21	0.6	0.02	1.3	4.0	0.0
	22	0	0	0	0	0	11	1	0	0	0	12	100	4.5	0.33	2.3	12.3	0.5	690	30.9	0.96	75.8	149.3	3.9
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	78	4.9	0.28	5.4	10.4	0.0	208	18.8	0.54	21.0	31.8	0.2
N	9	0	0	0	0	2	8	0	0	2	0	6	87	2.9	0.19	4.5	9.5	0.0	367	5.7	0.14	30.0	49.9	1.3
N	15	0	0	0	0	0	6	3	0	3	0	7	83	3.9	0.17	4.8	12.4	0.0	133	8.6	0.28	11.0	22.4	0.0
	18	0	0	0	0	0	9	0	0	3	0	9							453	54.5	1.12	32.4	62.1	2.8
N	21	0	0	0	0	3	3	0	0	6	0	4	36	1.3	0.11	3.5	7.9	0.0	173	22.6	0.72	17.4	24.8	0.9
N	OCT 21	0	0	0	0	0	10	0	0	2	0	9	52	3.3	0.13	5.8	7.3	0.0	92	9.4	0.26	7.3	11.6	0.4
N	NOV 12	0	0	0	0	0	9	3	0	0	0	11	35	8.2	0.07	4.5	6.9	0.0	40	3.2	0.13	2.7	4.9	0.0
												n	9	9	9	9	9	9	10	10	10	10	10	10
												Geo Mean	62	3.2	0.15	4.0	9.0	0.1	160	10.7	0.31	12.7	24.1	0.4
												Max	120	8.2	0.37	6.6	16.8	0.48	690	54.5	1.12	75.8	149.3	3.9

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29543 Dofasco - #4 Galvanizing TSP	Fe	Mn	FreeC	TotalC	CO3	29545 Dofasco - Quality Centre TSP	Fe	Mn	FreeC	TotalC	CO3
	AUG 16	0	0	0	0	4	8	0	0	0	5	18	191	15.3	0.38	12.5	30.3	0.5	163	10.5	0.48	5.6	18.6	1.7
N	19	0	0	0	0	6	6	0	0	0	1	14	42	1.4	0.08	4.2	7.3	0.0	151	5.0	0.28	11.4	22.9	0.8
	22	0	0	0	0	0	11	1	0	0	0	12	204	16.1	0.59	8.0	24.0	1.3	160	9.3	0.37	4.9	15.6	1.7
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	132	9.7	0.33	12.0	22.5	0.2	90	5.6	0.17	3.6	8.1	0.3
N	9	0	0	0	0	2	8	0	0	2	0	6	156	9.5	0.40	11.2	15.7	0.3	133	5.0	0.29	5.2	11.6	0.7
N	15	0	0	0	0	0	6	3	0	3	0	7	138	9.8	0.31	14.8	27.4	0.0	104	3.6	0.21	3.5	13.2	0.5
	18	0	0	0	0	0	9	0	0	3	0	9	169	15.3	0.48	15.2	25.1	1.1	161	9.7	0.53	6.3	18.0	2.3
N	21	0	0	0	0	3	3	0	0	6	0	4	56	3.9	0.16	5.3	7.6	0.0	59	3.2	0.14	3.4	9.4	0.3
N	OCT 21	0	0	0	0	0	10	0	0	2	0	9	87	4.2	0.46	7.2	12.7	0.5	47	1.9	0.11	2.2	5.2	0.3
N	NOV 12	0	0	0	0	0	9	3	0	0	0	11	69	9.1	0.07	18.5	26.6	0.0	31	0.8	0.05	1.7	3.7	0.0
												n	10	10	10	10	10	10	10	10	10	10	10	10
												Geo Mean	110	7.7	0.27	9.9	17.9	0.2	96	4.3	0.21	4.2	11.0	0.5
												Max	204	16.1	0.59	18.5	30.34	1.3	163	10.5	0.53	11.4	22.9	2.3

TABLE 12

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

SW WIND DAYS

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29555 Strathearn TSP	Fe	Mn	FreeC	TotalC	CO3	29557 Philips Rod Mill TSP	Fe	Mn	FreeC	TotalC	CO3
	AUG 16	0	0	0	0	4	8	0	0	0	5	18	144	7.9	0.53	4.4	17.9	1.7	140	5.3	0.23	9.8	16.7	1.0
											1	14	56	0.8	0.06	4.0	13.1	0.2	26	0.2	0.03	0.6	4.4	0.0
N	19	0	0	0	0	6	6	0	0	0														
	22	0	0	0	0	0	11	1	0	0	0	12	121	3.3	0.32	4.9	13.0	1.4	149	6.0	0.30	8.1	18.7	1.8
N	SEP 3	0	0	0	0	0	7	4	1	0	0	10	65	2.8	0.16	3.9	7.4	0.0	106	3.4	0.11	16.9	22.1	0.1
N	9	0	0	0	0	2	8	0	0	2	0	6	103	3.7	0.23	2.8	8.3	0.0	114	4.2	0.14	7.1	13.2	0.4
N	15	0	0	0	0	0	6	3	0	3	0	7	71	1.8	0.12	1.8	9.2	0.2	78	1.3	0.08	6.6	14.4	0.0
	18	0	0	0	0	0	9	0	0	3	0	9	136	5.0	0.33	4.2	16.5	7.4	153	7.3	0.28	8.0	19.1	2.7
N	21	0	0	0	0	3	3	0	0	6	0	4	40	1.8	0.10	3.1	7.0	0.9	38	0.7	0.05	2.3	4.3	0.0
N	OCT 21	0	0	0	0	0	10	0	0	2	0	9	32	1.1	0.09	1.3	3.8	0.1	44	0.8	0.05	8.1	11.3	0.0
N	NOV 12	0	0	0	0	0	9	3	0	0	0	11	21	0.8	0.04	1.0	2.6	0.0	51	1.2	0.04	19.5	23.4	0.0
												n	10	10	10	10	10	10	10	10	10	10	10	10
												Geo Mean	67	2.2	0.15	2.8	8.5	0.3	76	1.9	0.10	6.4	12.9	0.2
												Max	144	7.9	0.53	4.9	17.9	7.4	153	7.3	0.3	19.5	23.4	2.7

TABLE 13

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

WEST WIND DAYS

	1991	HOURS OF WIND/12 HOURS WOODWARD STP									HR'S > 20 km/hr	AVG SPEED km/hr	29531 J.I. Case Plant						29539 Stelco - General Office						29537 Stelco - East Filtration Plant					
	DATE	N	NE	E	SE	S	SW	W	NW	CALM			TSP	Fe	Mn	FreeC	TotalC	CO3	TSP	Fe	Mn	FreeC	TotalC	CO3	TSP	Fe	Mn	FreeC	TotalC	CO3
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	53	0.8	0.12	1.9	10.5	0.8	78	2.5	0.17	6.0	10.6	0.8	123	12.2	0.36	8.5	22.4	2.1
	4	0	0	0	0	0	0	8	4	0	0	10	27	0.7	0.16	1.2	6.3	0.0	79	3.3	0.17	13.6	19.8	1.5	132	14.9	0.57	9.0	20.4	1.1
	10	0	0	0	0	0	0	8	4	0	0	11							143	15.9	0.41	12.6	24.5	1.1	206	25.3	0.83	16.9	28.0	2.9
	28	0	0	0	0	0	2	10	0	0	0	10	101	2.9	0.36	2.3	13.4	1.0	163	12.0	0.57	4.0	14.8	1.9	225	17.8	0.96	8.8	24.9	3.3
N	SEP 27	0	0	0	0	0	1	9	2	0	0	8	24	0.9	0.09	0.7	4.6	0.0	102	2.3	0.23	2.2	6.1	0.0	82	6.6	0.34	6.0	12.3	0.8
N	OCT 15	0	0	0	0	0	3	9	0	0	0	9	23	1.9	0.05	1.1	4.8	1.2	31	0.3	0.04	3.2	5.4	0.0	83	12.9	0.32	6.2	10.9	0.3
	18	0	0	0	0	0	4	8	0	0	0	11	44	1.0	0.36	1.3	6.4	0.8	56	1.7	0.38	1.2	5.0	0.8	97	13.3	0.46	5.3	10.4	1.4
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	15	0.4	0.03	0.8	1.9	0.0	32	0.8	0.04	2.1	3.2	0.0	29	2.2	0.07	2.4	4.0	0.0
												n	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8
												Geo Mea	34	1.0	0.12	1.2	5.9	0.3	73	2.5	0.18	4.1	8.9	0.4	105	10.9	0.39	6.9	14.3	0.9
												Max	101	2.9	0.36	2.3	13.4	1.2	163	15.9	0.57	13.5	24.5	1.9	225	25.3	0.96	16.9	28.0	3.3

	1991	HOURS OF WIND/12 HOURS WOODWARD STP									HR'S > 20 km/hr	AVG SPEED km/hr	29533 Stelco - Crane 56 Runway						29535 Stelco - Chem Lab					
	DATE	N	NE	E	SE	S	SW	W	NW	CALM			TSP	Fe	Mn	FreeC	TotalC	CO3	TSP	Fe	Mn	FreeC	TotalC	CO3
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	312	29.4	2.22	30.9	52.0	4.0	130	6.3	0.35	15.8	34.4	1.3
	4	0	0	0	0	0	0	8	4	0	0	10	164	9.5	1.44	5.5	10.7	0.7	147	21.1	0.73	19.9	32.2	1.2
	10	0	0	0	0	0	0	8	4	0	0	11	185	7.7	0.98	7.6	15.3	1.5	288	38.8	1.44	29.7	41.8	3.7
	28	0	0	0	0	0	2	10	0	0	0	10	327	21.6	2.62	17.0	27.3	2.9	231	21.5	1.25	13.4	28.0	0.6
N	SEP 27	0	0	0	0	0	1	9	2	0	0	8	125	11.8	1.37	4.4	8.5	0.6	89	6.1	0.58	8.6	16.2	0.5
N	OCT 15	0	0	0	0	0	3	9	0	0	0	9	162	17.7	1.52	14.4	20.8	0.5	74	3.3	1.31	13.1	21.5	0.1
	18	0	0	0	0	0	4	8	0	0	0	11	160	20.2	1.60	7.2	12.6	1.9	133	12.0	0.79	10.2	21.1	3.1
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	120	23.7	0.04	5.1	7.6	0.8	44	2.2	0.10	0.7	2.9	0.0
												n	8	8	8	8	8	8	8	8	8	8	8	8
												Geo Mea	182	16.2	1.01	9.2	15.8	1.2	122	9.4	0.64	10.0	20.2	0.6
												Max	327	29.4	2.62	30.9	52.0	4.0	288	38.8	1.44	29.7	41.8	3.7

TABLE 14

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

WEST WIND DAYS

	1991	HOURS OF WIND/12 HOURS WOODWARD STP								HR'S	AVG	29547 Beach Strip Pier 25						29541 Dofasco - Harbour Shore					
	DATE	N	NE	E	SE	S	SW	W	NW	CALM	> 20 km/hr	SPEED km/hr	TSP	Fe	Mn	FreeC	TotalC	CO3	TSP	Fe	Mn	FreeC	TotalC	CO3
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	129	8.5	0.33	10.9	22.4	0.4	212	21.7	0.87	22.2	47.8	1.0
	4	0	0	0	0	0	0	8	4	0	0	10	36	1.4	0.10	1.8	6.5	0.0	74	4.2	0.36	5.1	11.5	0.0
	10	0	0	0	0	0	0	8	4	0	0	11	95	15.6	0.28	5.0	12.5	0.5	95	4.6	0.40	4.8	11.8	0.2
	28	0	0	0	0	0	2	10	0	0	0	10	162	10.0	0.59	6.2	19.4	0.7	383	40.7	1.23	18.6	49.1	1.2
N	SEP 27	0	0	0	0	0	1	9	2	0	0	8	91	7.7	0.35	9.2	16.3	0.0	119	15.6	0.54	8.8	15.5	1.0
N	OCT 15	0	0	0	0	0	3	9	0	0	0	9	101	8.0	0.54	9.6	15.6	0.0	145	12.2	0.77	14.8	27.9	0.0
	18	0	0	0	0	0	4	8	0	0	0	11	50	2.4	0.17	4.4	7.1	0.4	113	8.7	0.46	7.6	13.8	1.7
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	34	2.4	0.09	3.7	4.6	0.0	59	6.0	0.11	9.6	14.5	0.0
												n	8	8	8	8	8	8	8	8	8	8	8	8
												Geo Mean	76	5.3	0.25	5.5	11.4	0.2	127	10.7	0.49	9.9	20.2	0.3
												Max	162	15.6	0.59	10.9	22.4	0.7	383	40.7	1.23	22.2	49.1	1.7

	1991	HOURS OF WIND/12 HOURS WOODWARD STP								HR'S	AVG	29543 Dofasco - #4 Galvanizing						29545 Dofasco - Quality Centre					
	DATE	N	NE	E	SE	S	SW	W	NW	CALM	> 20 km/hr	SPEED km/hr	TSP	Fe	Mn	FreeC	TotalC	CO3	TSP	Fe	Mn	FreeC	TotalC	CO3
	AUG 1	0	0	0	0	0	4	8	0	0	0	10	172	19.5	0.52	14.5	33.2	0.7	75	2.6	0.24	2.9	10.7	1.0
	4	0	0	0	0	0	0	8	4	0	0	10	162	19.4	0.65	16.1	29.4	0.6	56	3.8	0.27	3.9	12.1	0.5
	10	0	0	0	0	0	0	8	4	0	0	11	201	29.9	0.70	21.2	35.4	0.8	98	8.4	0.37	2.5	6.5	1.0
	28	0	0	0	0	0	2	10	0	0	0	10	285	21.3	0.83	19.3	37.5	1.6	151	5.2	0.38	6.1	14.9	1.8
	SEP 27	0	0	0	0	0	1	9	2	0	0	8	169	8.4	0.47	22.0	31.1	0.5	57	3.0	0.17	3.1	7.2	0.6
	OCT 15	0	0	0	0	0	3	9	0	0	0	9	168	16.1	0.65	19.2	29.3	0.4	71	3.6	0.36	3.9	10.5	1.0
	18	0	0	0	0	0	4	8	0	0	0	11	96	9.4	0.29	13.6	19.5	1.1	67	2.7	0.23	3.1	8.7	1.5
	NOV 2	0	0	0	0	0	5	7	0	0	0	15	61	7.2	0.13	8.9	15.0	0.1	27	0.9	0.05	1.5	2.6	0.0
												n	8	8	8	8	8	8	8	8	8	8	8	8
												Geo Mean	151	14.7	0.47	16.3	27.7	0.6	68	3.2	0.22	3.2	8.2	0.7
												Max	285	29.9	0.83	22.0	37.5	1.6	151	8.4	0.38	6.1	14.9	1.8

TABLE 15

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

WEST WIND DAYS

	1991	HOURS OF WIND/12 HOURS WOODWARD STP									HR'S	AVG	29555 Strathearn						29557 Philips Rod Mill					
	DATE	N	NE	E	SE	S	SW	W	NW	CALM	> 20 km/hr	SPEED km/hr	TSP	Fe	Mn	FreeC	TotalC	CO3	TSP	Fe	Mn	FreeC	TotalC	CO3
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	71	4.3	0.30	2.8	7.4	1.0	95	2.9	0.14	16.2	25.4	0.4
	4	0	0	0	0	0	0	8	4	0	0	10	54	3.9	0.17	2.4	7.8	0.0	52	3.8	0.17	4.2	8.0	0.0
	10	0	0	0	0	0	0	8	4	0	0	11	82	6.9	0.22	4.6	12.2	0.7	88	7.1	0.23	5.1	10.8	0.6
	28	0	0	0	0	0	2	10	0	0	0	10	154	4.2	0.36	2.8	11.8	1.6	155	0.7	0.04	11.5	21.8	1.4
N	SEP 27	0	0	0	0	0	1	9	2	0	0	8	38	2.8	0.13	2.1	4.4	0.1	38	2.5	0.14	1.5	4.6	0.0
N	OCT 15	0	0	0	0	0	3	9	0	0	0	9	46	2.4	0.19	1.7	5.7	0.5	47	2.5	0.21	3.5	7.6	0.0
	18	0	0	0	0	0	4	8	0	0	0	11	61	2.2	0.18	2.3	7.1	1.2	65	1.8	0.11	7.3	13.8	0.9
N	NOV 2	0	0	0	0	0	5	7	0	0	0	15	18	0.8	0.03	0.9	1.9	0.0	40	0.6	0.02	11.3	13.6	0.0
													8	8	8	8	8	8	8	8	8	8	8	8
													56	3.0	0.16	2.2	6.4	0.3	65	2.1	0.10	6.0	11.5	0.2
													154	6.9	0.36	4.6	12.2	1.6	155	7.1	0.23	16.1	25.4	1.4

TABLE 16

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

NE WIND DAYS

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29531 J.I. Case Plant TSP	Fe	Mn	FreeC	TotalC	CO3	29539 Stelco - General Office TSP	Fe	Mn	FreeC	Tota	CO3	29537 Stelco - East Filtration Plant TSP	Fe	Mn	FreeC	Tota	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	34	2.3	0.11	1.8	7.8	0.3	83	3.7	0.17	10.4	17.2	0.6	167	22.7	0.78	14.8	30.4	2.1
N	AUG 31	6	6	0	0	0	0	0	0	0	5	18	77	5.3	0.27	3.5	10.0	0.5	129	7.9	0.41	5.9	14.1	2.1	168	20.0	0.36	9.0	22.5	3.4
	SEP 6	0	1	8	0	0	0	0	0	3	0	8	115	11.5	1.22	3.8	12.3	1.4	185	8.8	0.55	10.4	20.6	2.4	278	26.7	1.07	13.2	34.5	5.9
	12	1	2	6	0	0	0	0	2	1	0	9	146	12.4	0.72	7.4	23.3	1.9	158	11.8	0.70	11.3	18.1	2.1	177	16.4	0.58	17.8	34.4	2.7
	24	0	8	0	0	0	0	0	0	4	0	6	122	8.3	1.48	12.1	25.0	1.8	119	8.9	1.53	5.0	13.6	1.6	169	32.9	0.77	9.0	19.9	2.9
N	OCT 27	4	8	0	0	0	0	0	0	0	0	16	38	3.7	0.13	5.9	8.9	0.0	20	1.8	0.11	0.7	2.9	0.0	37	7.9	0.12	2.2	5.0	0.0
	30	0	10	2	0	0	0	0	0	0	0	10	67	10.5	0.25	4.6	8.2	0.3	48	8.0	0.21	3.2	4.8	0.6	100	20.9	0.20	8.0	8.2	0.9
											n		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
											Geo Mean		75	6.6	0.39	4.8	12.2	0.5	86	6.3	0.37	5.0	10.8	0.8	136	19.5	0.44	9.0	18.2	1.5
											Max		146	12.4	1.48	12.1	25.0	1.9	185	11.8	1.58	11.3	20.6	2.4	278	32.9	1.07	17.8	34.5	5.9

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29533 Stelco - Crane 56 Runway TSP	Fe	Mn	FreeC	TotalC	CO3	29535 Stelco - Chem Lab TSP	Fe	Mn	FreeC	Tota	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	120	4.2	0.60	4.9	10.2	1.2	170	16.9	0.63	30.3	42.5	2.3
N	AUG 31	6	6	0	0	0	0	0	0	0	5	18	65	3.8	0.31	1.7	6.4	0.2	212	18.2	1.29	4.8	12.9	3.9
	SEP 6	0	1	8	0	0	0	0	0	3	0	8	149	6.7	0.79	6.5	11.1	0.8	295	23.8	1.67	17.3	38.8	5.4
	12	1	2	6	0	0	0	0	2	1	0	9	53	2.0	0.15	2.5	7.2	0.3	203	20.6	0.84	8.3	21.1	3.8
	24	0	8	0	0	0	0	0	0	4	0	6	94	4.4	0.56	3.6	7.5	1.5	171	13.8	1.27	9.8	19.0	3.6
N	OCT 27	4	8	0	0	0	0	0	0	0	0	16	12	0.8	0.07	0.3	0.8	0.0	42	3.0	0.31	1.7	2.8	0.8
	30	0	10	2	0	0	0	0	0	0	0	10	15	0.4	0.03	0.4	1.8	0.0	16	9.0	0.28	4.7	6.6	2.4
											n		7	7	7	7	7	7	7	7	7	7	7	7
											Geo Mean		52	2.3	0.22	1.8	4.8	0.3	114	25.6	0.74	7.7	14.8	2.8
											Max		149	6.7	0.79	6.5	11.1	1.5	295	23.8	1.67	30.3	42.5	5.4

TABLE 17

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

NE WIND DAYS

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29547 Beach Strip Pier 25 TSP	Fe	Mn	FreeC	TotalC	CO3	29541 Dofasco - Harbour Shore TSP	Fe	Mn	FreeC	TotalC	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	53	2.8	0.15	3.7	9.0	0.1	63	2.7	0.31	3.8	11.1	0.4
N	AUG 31	6	6	0	0	0	0	0	0	0	5	18	73	1.6	0.16	1.9	4.2	0.4	50	2.5	0.08	4.1	7.6	0.0
	SEP 6	0	1	8	0	0	0	0	0	3	0	8	119	1.9	0.22	3.7	9.1	0.2	129	4.6	0.27	8.0	13.5	0.4
	12	1	2	6	0	0	0	0	2	1	0	9	53	1.2	0.08	2.1	6.4	0.1	82	4.8	0.15	8.0	14.3	0.0
	24	0	8	0	0	0	0	0	0	4	0	6	79	2.8	0.23	3.0	7.0	0.0	75	5.6	0.38	4.2	13.0	0.1
N	OCT 27	4	8	0	0	0	0	0	0	0	0	16	5	0.1	0.00	0.3	1.0	0.0	8	0.7	0.02	0.7	1.5	0.0
	30	0	10	2	0	0	0	0	0	0	0	10							9	0.2	0.00	0.3	2.0	0.0
												n	6	6	6	6	6	6	7	7	7	7	7	7
												Geo Mean	46	1.2	0.09	1.9	5.0	0.1	41	2.0	0.09	2.6	6.7	0.1
												Max	119	2.8	0.23	3.7	9.1	0.4	129	5.6	0.38	8.0	14.3	0.4

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29543 Dofasco - #4 Galvanizing TSP	Fe	Mn	FreeC	TotalC	CO3	29545 Dofasco - Quality Centre TSP	Fe	Mn	FreeC	TotalC	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	138	15.8	0.50	17.7	28.2	0.6	81	4.7	0.27	7.0	15.7	0.7
N	AUG 31	6	6	0	0	0	0	0	0	0	5	18	104	5.8	0.53	3.0	8.2	0.8	218	23.9	0.56	12.9	19.9	2.1
	SEP 6	0	1	8	0	0	0	0	0	3	0	8	145	6.0	0.36	10.8	17.6	1.4	258	20.1	0.92	14.8	26.4	3.3
	12	1	2	6	0	0	0	0	2	1	0	9	100	6.3	0.43	5.8	12.9	0.9	182	12.5	0.48	9.4	22.9	2.4
	24	0	8	0	0	0	0	0	0	4	0	6	103	9.3	0.43	8.2	15.8	0.6	163	7.2	0.60	9.7	24.1	2.4
N	OCT 27	4	8	0	0	0	0	0	0	0	0	16	23	0.9	0.08	1.7	2.8	0.0	22	1.2	0.07	0.5	1.8	0.0
	30	0	10	2	0	0	0	0	0	0	0	10	35	1.9	0.10	2.1	3.8	0.0	106	22.7	0.28	9.3	13.9	0.7
												n	7	7	7	7	7	7	7	7	7	7	7	7
												Geo Mean	78	4.8	0.28	5.2	9.8	0.4	118	9.2	0.36	6.6	14.2	0.6
												Max	145	15.8	0.53	17.7	28.2	1.4	258	23.9	0.92	14.8	26.4	3.3

TABLE 18

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

NE WIND DAYS

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29555 Strathearn TSP	Fe	Mn	FreeC	TotalC	CO3	29557 Philips Rod Mill TSP	Fe	Mn	FreeC	TotalC	CO3
N	JUL 26	0	4	1	0	0	0	0	5	2	0	7	60	3.9	0.17	3.9	9.2	0.3	54	1.9	0.14	4.3	10.2	0.3
N	AUG 31	6	6	0	0	0	0	0	0	0	5	18	63	1.9	0.15	1.5	7.0	1.0	38	0.9	0.05	2.1	4.0	0.6
	SEP 6	0	1	8	0	0	0	0	0	3	0	8	236	12.2	0.52	8.7	19.0	4.3	200	5.7	0.53	4.8	12.9	1.7
	12	1	2	6	0	0	0	0	2	1	0	9	231	11.0	0.54	5.9	19.9	6.2	104	4.2	0.22	1.9	8.5	0.2
	24	0	9	0	0	0	0	0	0	4	0	6	159	5.1	0.45	5.5	17.6	3.4	97	4.8	0.25	4.9	11.9	1.7
N	OCT 27	4	8	0	0	0	0	0	0	0	0	16	9	0.2	0.01	0.7	1.4	0.0	6	0.0	0.00	0.5	1.4	0.9
	30	0	10	2	0	0	0	0	0	0	0	10	41	1.0	0.08	1.2	4.7	0.6	14	0.1	0.02	0.4	1.6	0.0
												n	7	7	7	7	7	7	7	7	7	7	7	7
												Geo Mean	74	2.7	0.16	2.8	8.3	1.0	45	1.0	0.08	1.9	5.3	0.5
												Max	236	12.2	0.54	8.7	19.9	6.2	200	5.7	0.53	4.9	12.9	1.7

TABLE 19

HIVOL SURVEY OF HAMILTON'S INDUSTRIAL ZONE

DAYS WHEN 29547-BEACH TSP > 100 ug/m3

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29547 Beach Strip Pier 25 TSP	Fe	Mn	FreeC	TotalC	29533 Stelco - Crane Runway TSP	Fe	Mn	FreeC	TotalC	29535 Stelco - Chem Lab TSP	Fe	Mn	FreeC	TotalC
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	129	8.5	0.33	10.9	22.4	312	29.4	2.22	30.9	52.0	130	6.3	0.35	15.8	34.4
N	13	0	0	0	0	0	0	0	0	12	0	1	175	19.8	0.75	15.3	31.6	303	25.2	1.80	18.4	31.3	220	14.3	0.50	40.0	63.3
	16	0	0	0	0	4	8	0	0	0	5	18	120	8.0	0.37	6.6	16.8	367	24.3	2.50	16.6	32.6	212	22.3	0.93	17.3	34.4
	22	0	0	0	0	0	11	1	0	0	0	12	100	4.5	0.33	2.3	12.3	205	13.4	1.13	5.2	19.9	182	16.8	0.75	6.7	23.6
N	25	0	3	1	0	3	3	0	0	2	0	8	106	2.0	0.16	1.2	8.1	130	3.8	0.55	4.6	11.1	148	6.1	0.54	6.9	16.5
	28	0	0	0	0	0	2	10	0	0	0	10	162	10.0	0.59	6.2	19.4	327	21.6	2.62	17.0	27.3	231	21.5	1.25	13.4	28.0
	SEP 6	0	1	8	0	0	0	0	0	3	0	8	119	1.9	0.22	3.7	9.1	149	6.7	0.79	6.5	11.1	295	23.8	1.67	17.3	38.8
N	OCT 15	0	0	0	0	0	3	9	0	0	0	9	101	8.0	0.54	9.6	15.6	162	17.7	1.52	14.4	20.8	74	3.3	1.31	13.1	21.5
											n		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
											Geo Mean		124	6.1	0.37	5.3	15.5	228	14.8	1.45	11.7	22.8	174	11.7	0.81	14.1	30.1
											Max		175	19.8	0.75	15.3	31.6	367	29.4	2.62	30.9	52.04	295	23.8	1.67	40.0	63.3

	1991 DATE	HOURS OF WIND/12 HOURS WOODWARD STP N	NE	E	SE	S	SW	W	NW	CALM	HR'S > 20 km/hr	AVG SPEED km/hr	29541 Dofasco - Harb Shore TSP	Fe	Mn	FreeC	TotalC	29543 Dofasco - Galvanizing TSP	Fe	Mn	FreeC	TotalC
N	AUG 1	0	0	0	0	0	4	8	0	0	0	10	212	21.7	0.87	22.2	47.8	172	19.5	0.52	14.5	33.2
N	13	0	0	0	0	0	0	0	0	12	0	1	341	31.7	1.21	26.9	54.1	278	31.8	0.84	28.9	46.1
	16	0	0	0	0	4	8	0	0	0	5	18	262	31.9	0.84	14.5	35.7	191	15.3	0.38	12.5	30.3
	22	0	0	0	0	0	11	1	0	0	0	12	690	30.9	0.96	75.8	149.3	204	16.1	0.59	9.0	24.0
N	25	0	3	1	0	3	3	0	0	2	0	8	157	6.6	0.27	13.5	29.4	105	4.2	0.26	5.1	11.2
	28	0	0	0	0	0	2	10	0	0	0	10	383	40.7	1.23	18.6	49.1	285	21.3	0.83	19.3	37.5
	SEP 6	0	1	8	0	0	0	0	0	3	0	8	129	4.6	0.27	8.0	13.5	145	6.0	0.36	10.8	17.6
N	OCT 15	0	0	0	0	0	3	9	0	0	0	9	145	12.2	0.77	14.8	27.9	168	16.1	0.65	19.2	29.3
											n		8	8	8	8	8	8	8	8	8	8
											Geo Mean		249	17.8	0.70	19.3	40.7	185	13.8	0.51	13.1	26.5
											Max		690	40.7	1.23	75.8	149.3	285	31.8	0.84	28.9	46.1

TABLE 20

CORRELATION COEFFICIENTS (r)

29547-BEACH VS FIVE INDUSTRY STATIONS
FOR DAYS WHEN BEACH TSP ›100 ug/m3

Jul - Nov 1991 Survey of Hamilton Industrial Zone

		TSP	Fe	Mn	FC	TC
29533	STELCO CRANE RUNWAY	0.62	0.73	0.56	0.75	0.70
29535	STELCO CHEM LAB	0.44	-0.02	-0.03	0.82	0.77
29537	STELCO EAST FILTRATION	0.55	0.22	0.21	0.62	0.58
29541	DOFASCO HARBOUR SHORE	0.08	0.60	0.83	-0.18	0.04
29543	DOFASCO GALV LINE	0.81	0.95	0.92	0.90	0.95

TSP Total Suspended Particulate

Fe Iron

Mn Manganese

FC Free(Elemental) Carbon

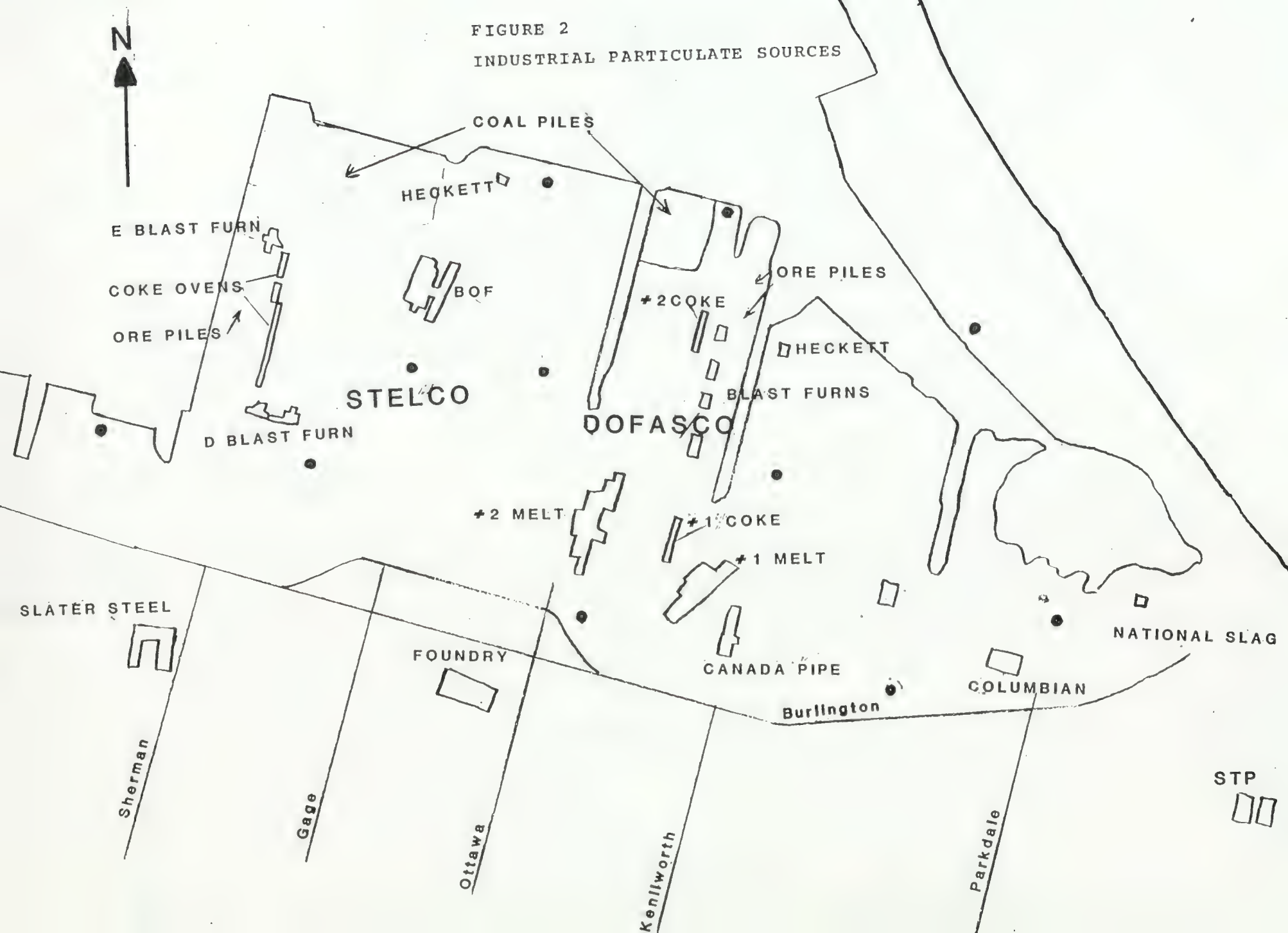
TC Total Carbon

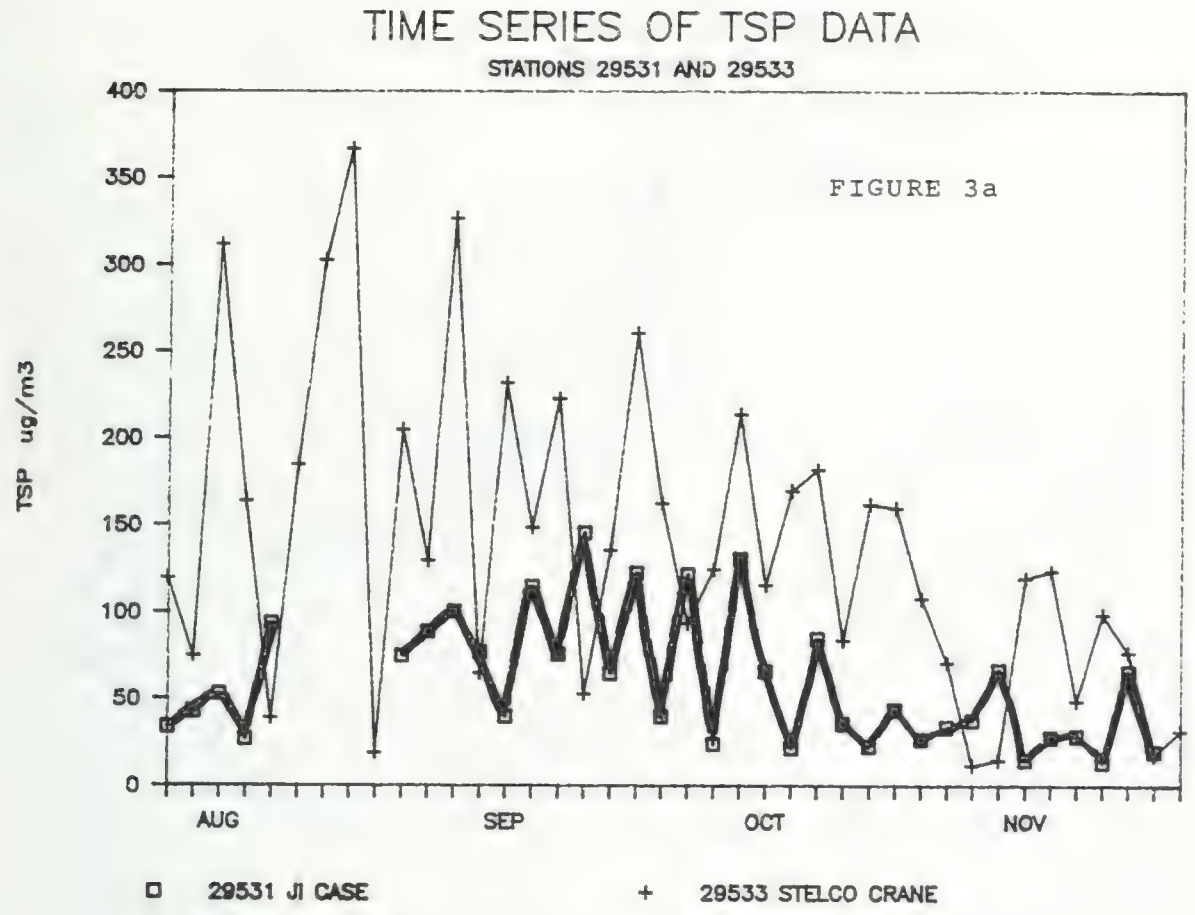
FIGURE 1

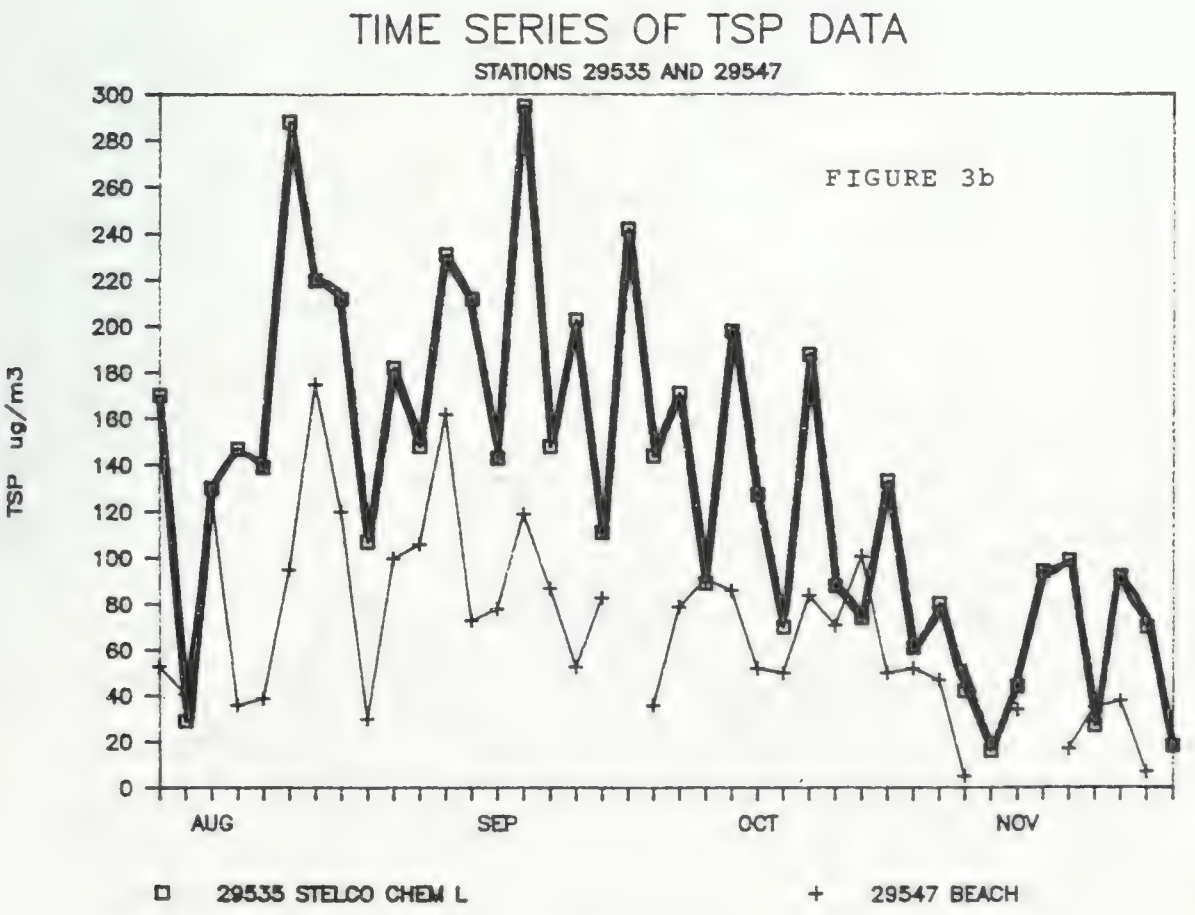
SURVEY STATION LOCATIONS

FIGURE 2

INDUSTRIAL PARTICULATE SOURCES



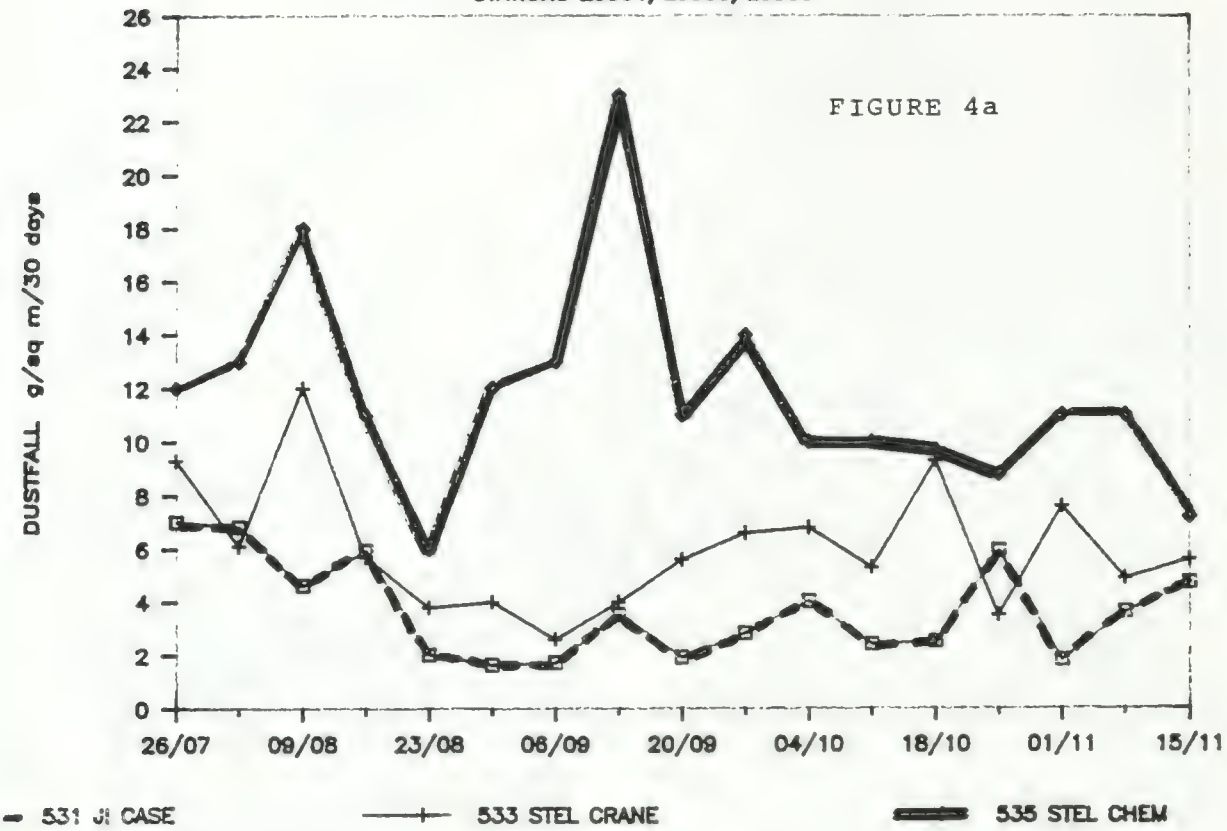

TIME SERIES OF TSP DATA
STATIONS 29531 AND 29533
FIGURE 3a
TSP ug/m3
400
350
300
250
200
150
100
50
0
AUG
SEP
OCT
NOV
29531 JI CASE
29533 STELCO CRANE


TIME SERIES OF TSP DATA
STATIONS 29535 AND 29547
FIGURE 3b
TSP ug/m3
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
AUG
SEP
OCT
NOV
29535 STELCO CHEM L
29547 BEACH

TIME SERIES OF DUSTFALL DATA

STATIONS 29531/29533/29535

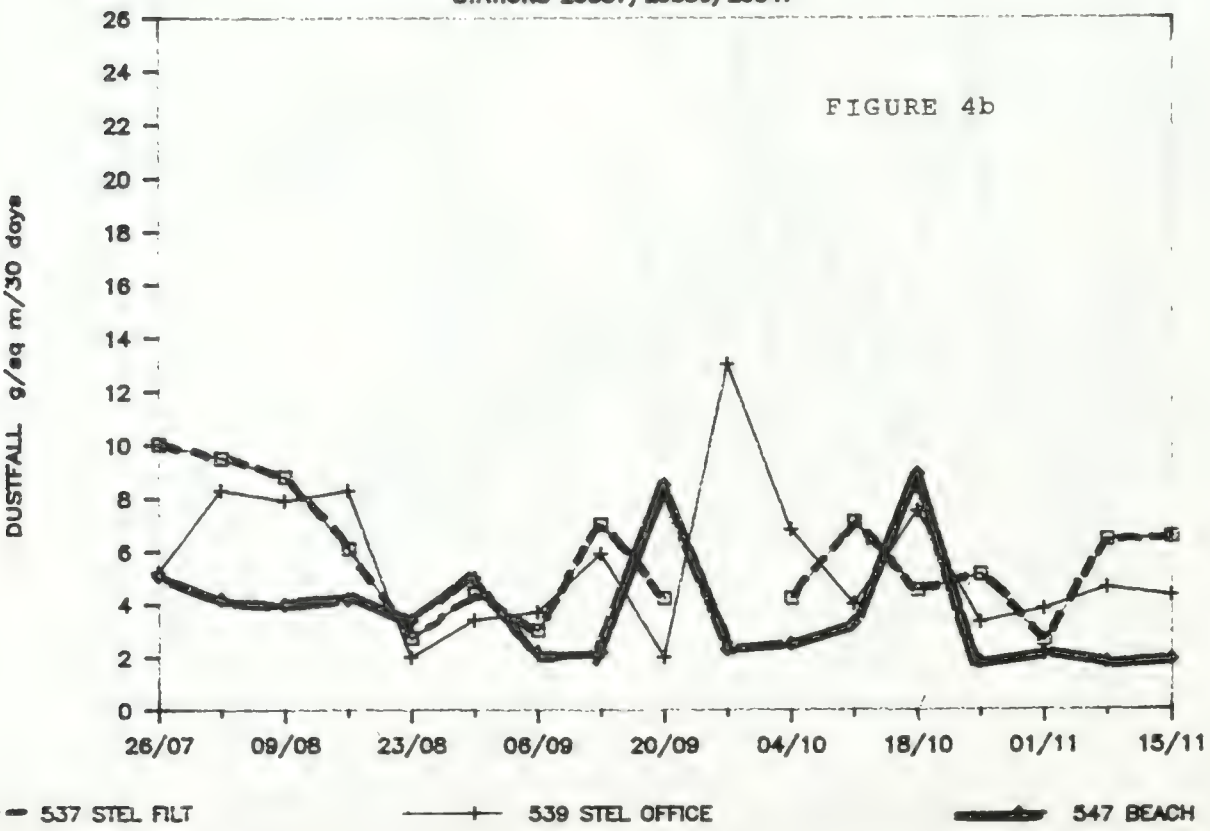
FIGURE 4a



TIME SERIES OF DUSTFALL DATA

STATIONS 29537/29539/29547

FIGURE 4b



TIME SERIES OF TSP

REGULAR NETWORK (AVG OF 4 STNS)

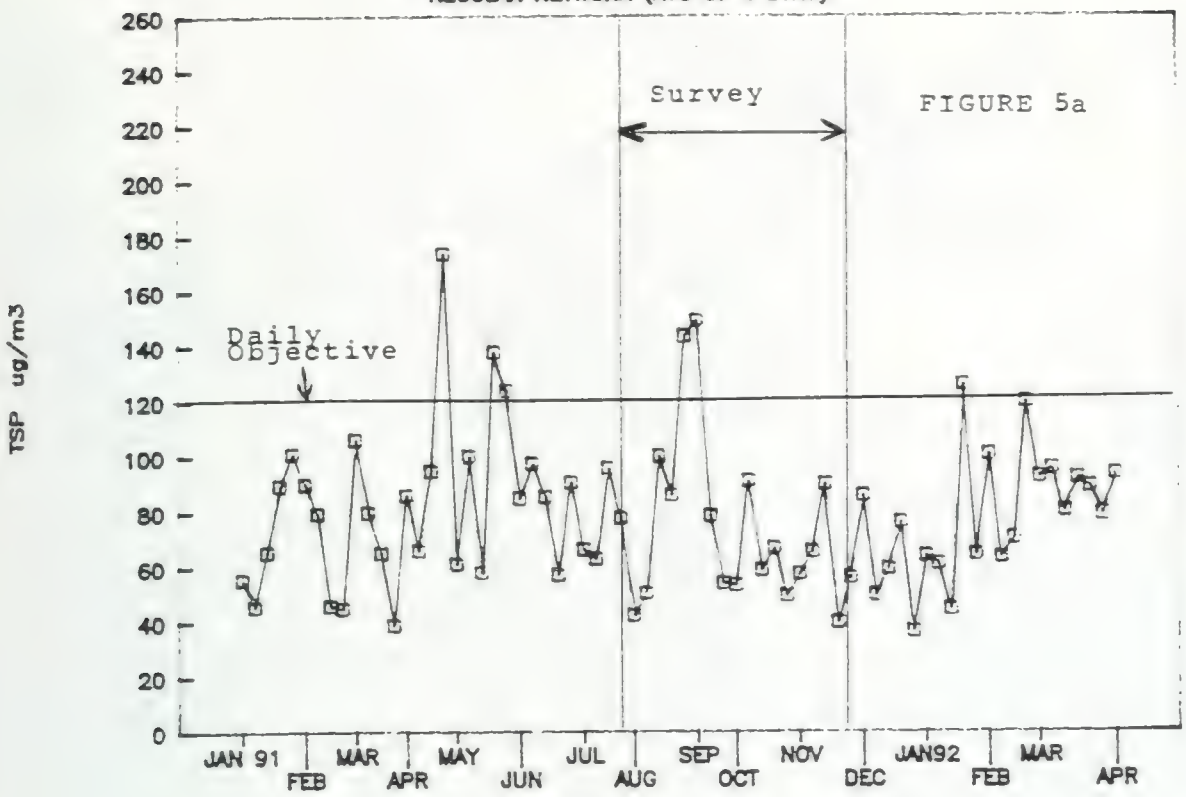


FIGURE 5a

TIME SERIES OF DUSTFALL

REGULAR NETWORK (AVG OF 5 STNS)

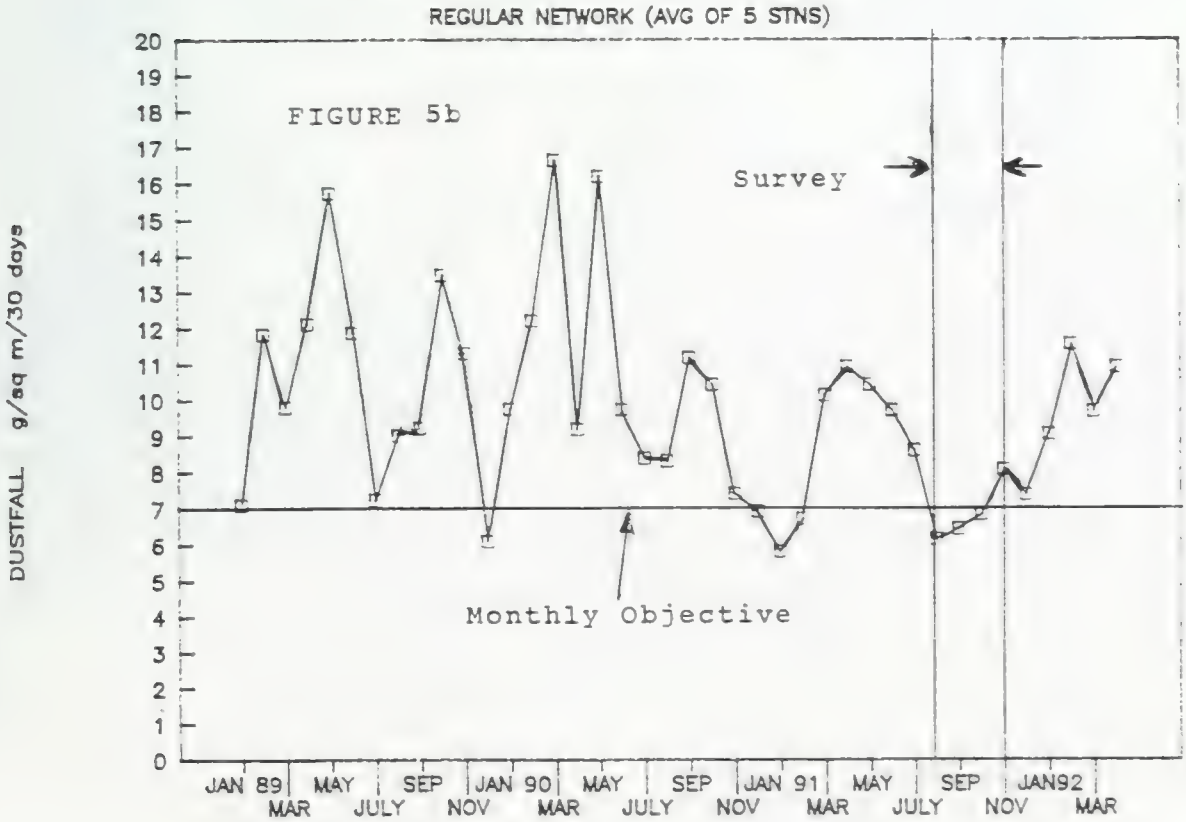


FIGURE 5b

FIGURE 6

Isopleths of TSP
Geometric Means

ug/m3

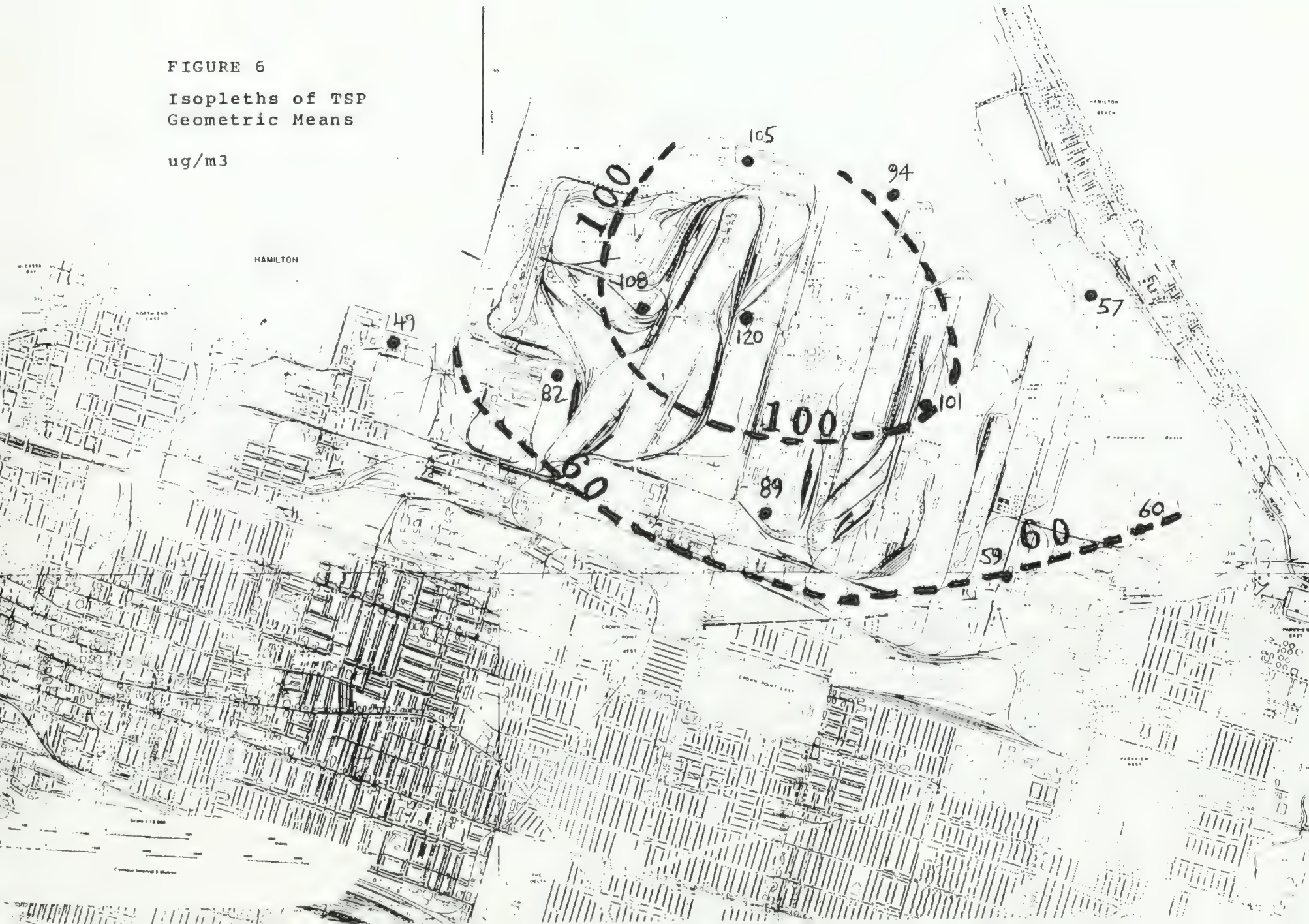


FIGURE 7

Isopleths of Iron in TSP
Geometric Means

ug/m3

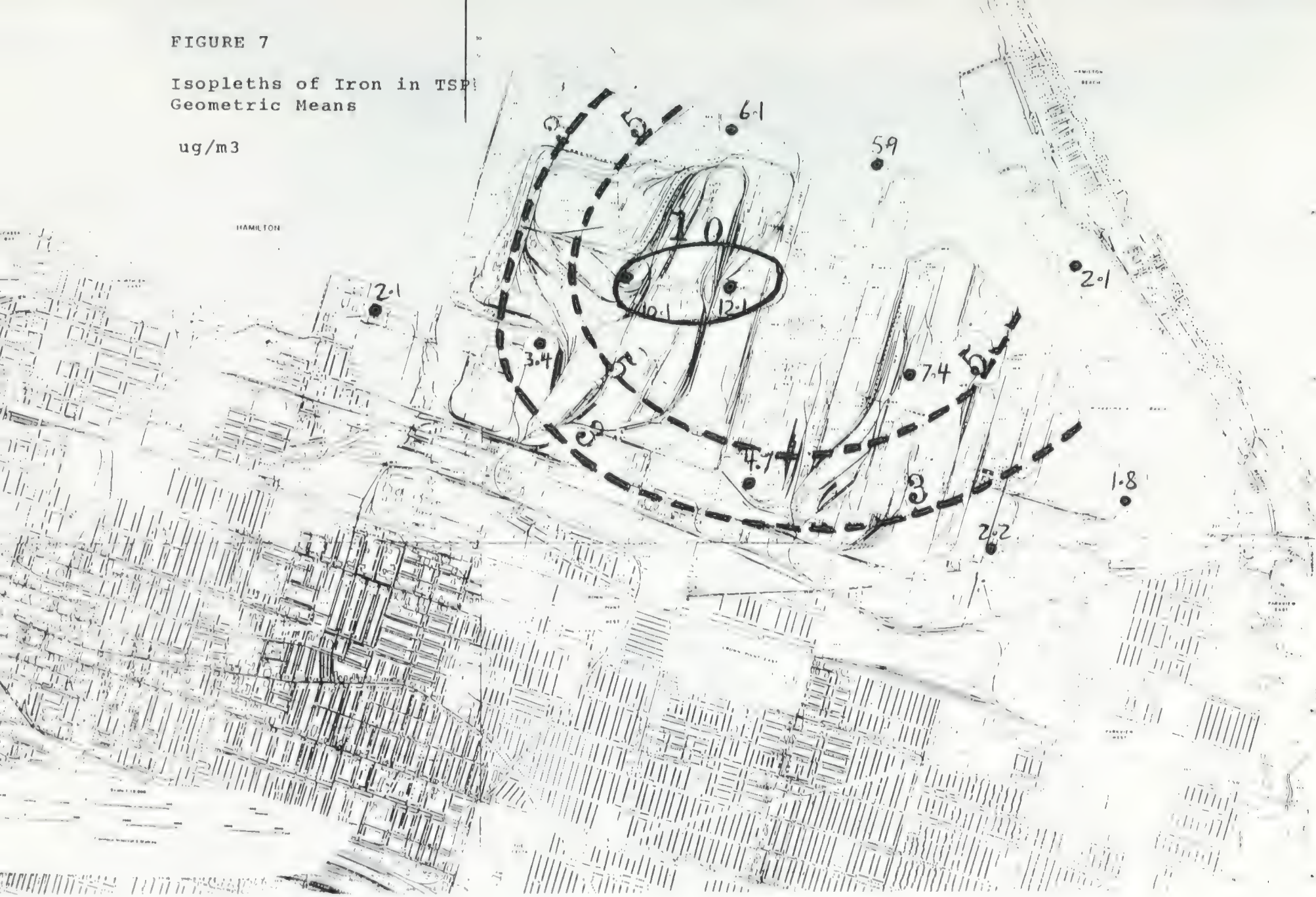


FIGURE 8

Isopleths of Manganese in TSP
Geometric Means

ug/m3

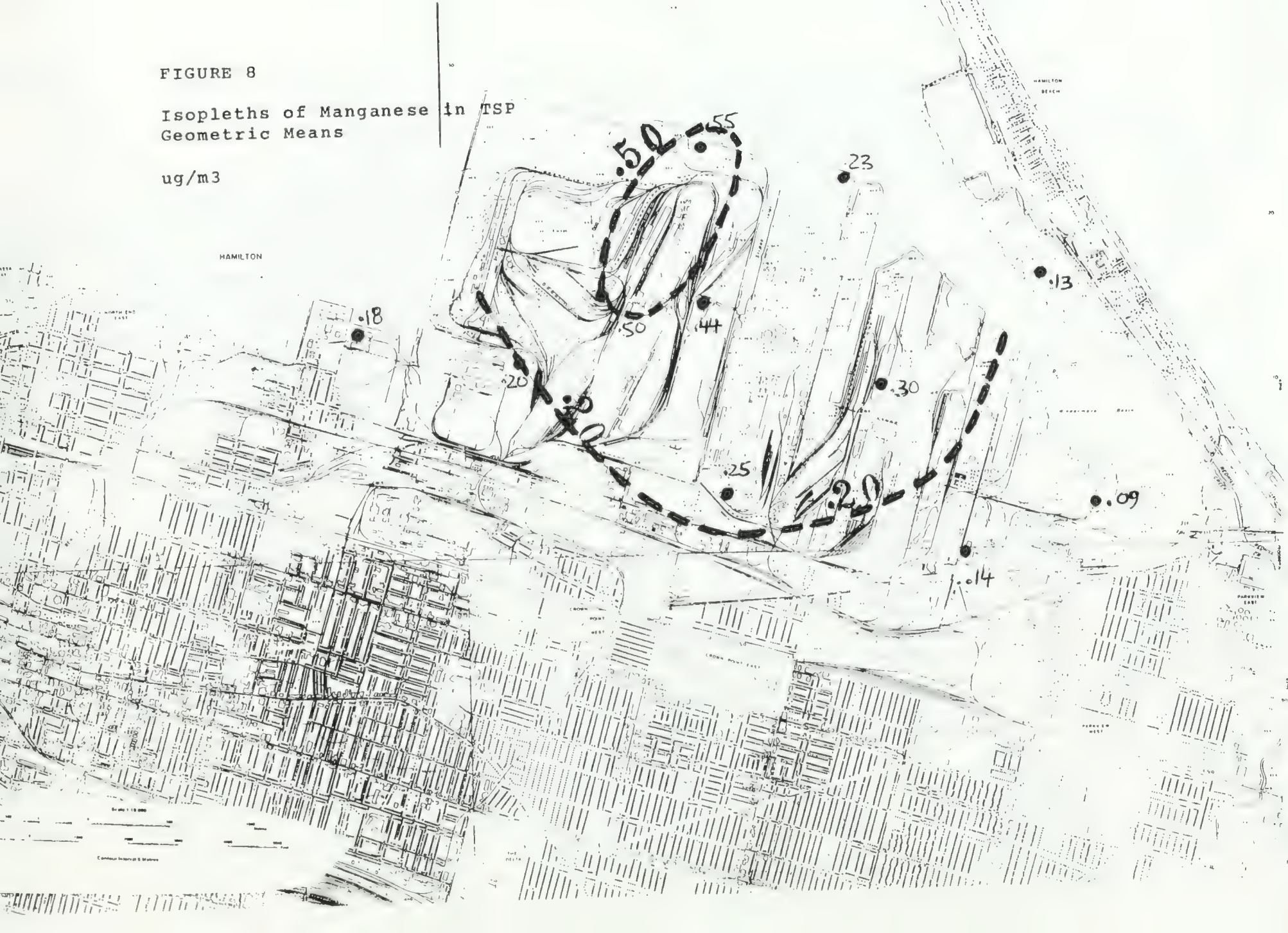


FIGURE 9

Isopleths of Iron in Dustfall Averages

g/sq m/30 days

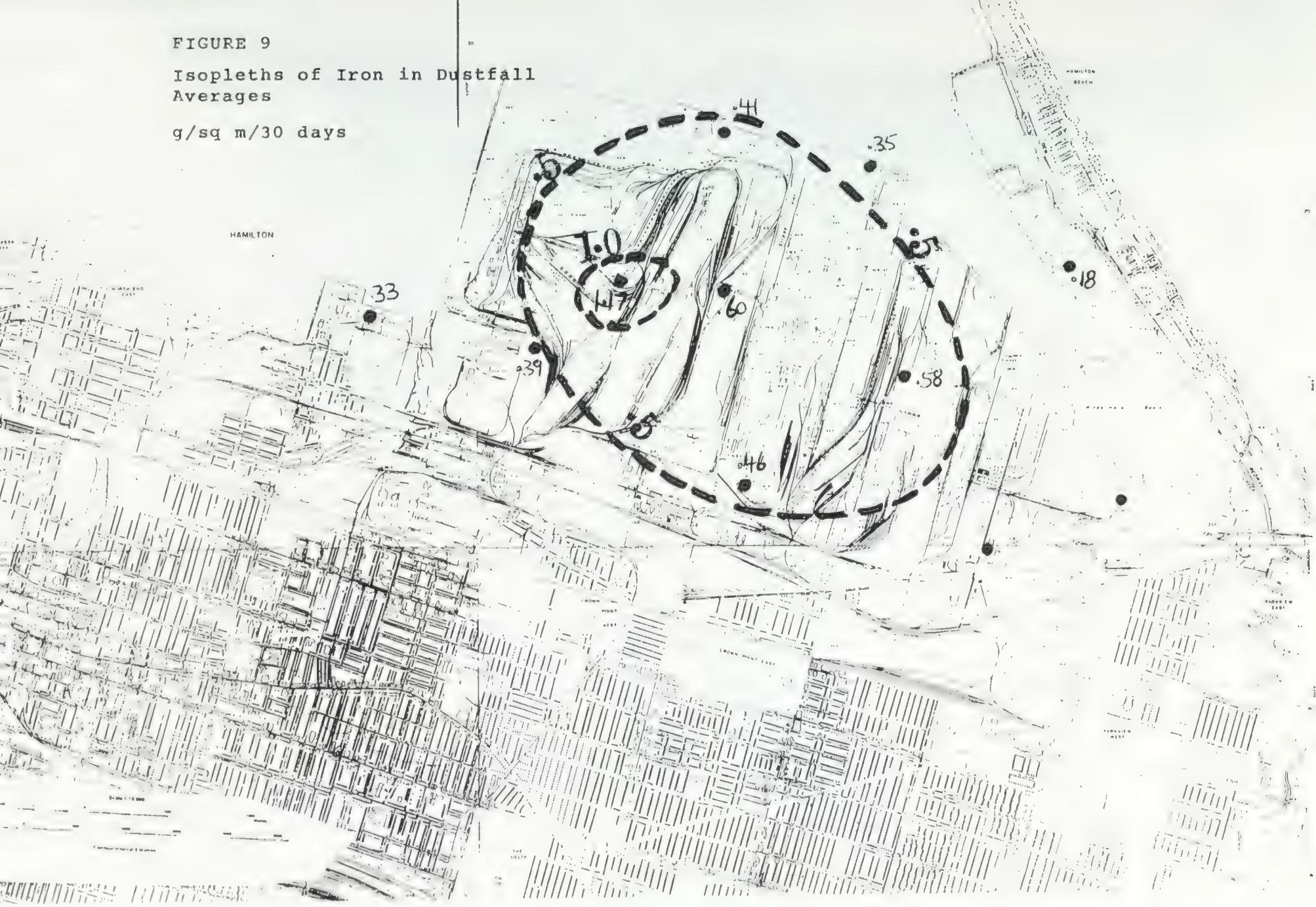
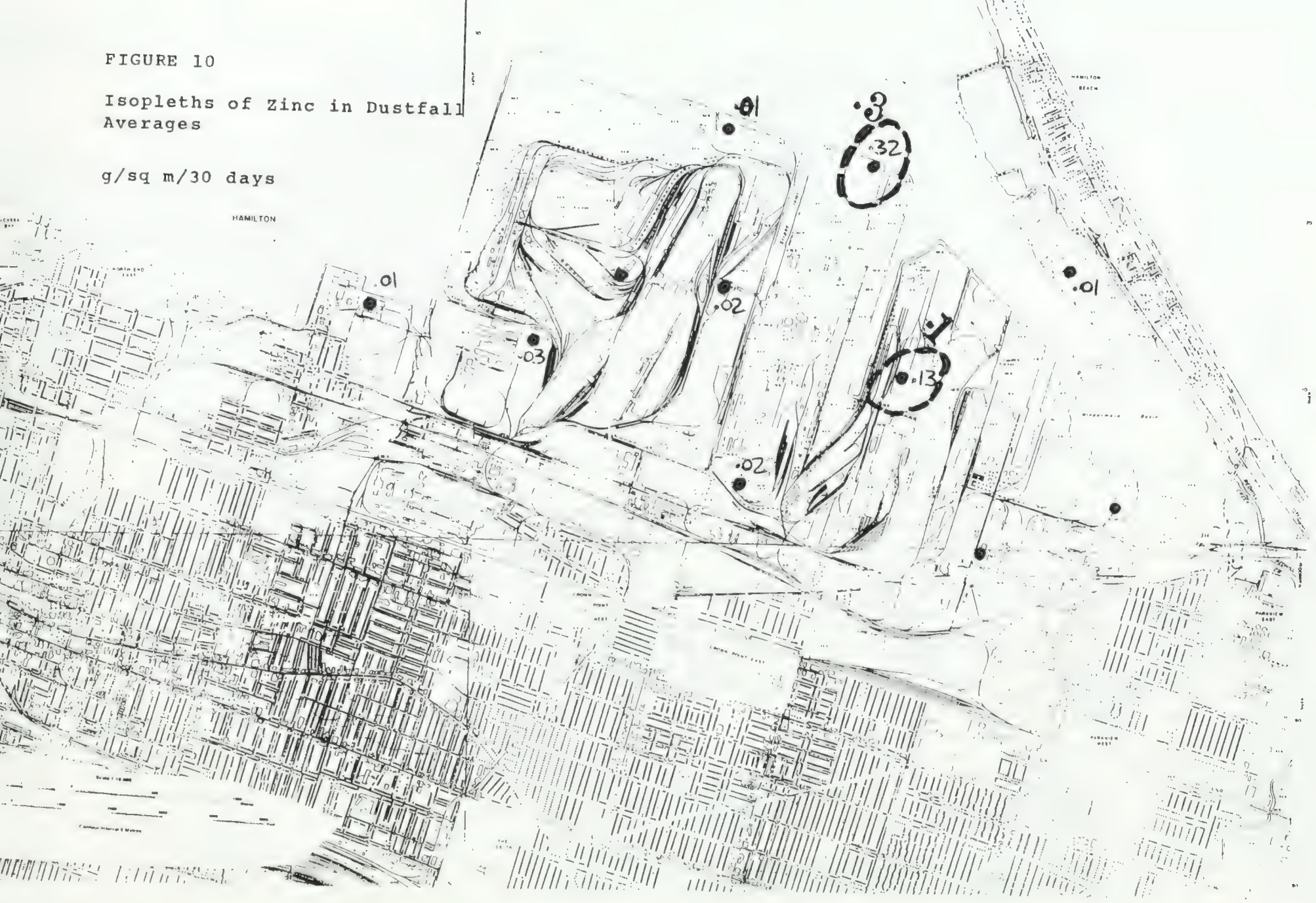


FIGURE 10

Isopleths of Zinc in Dustfall Averages

g/sq m/30 days



TSP STATION MEANS

INDUSTRIAL AREA PARTICULATE SURVEY

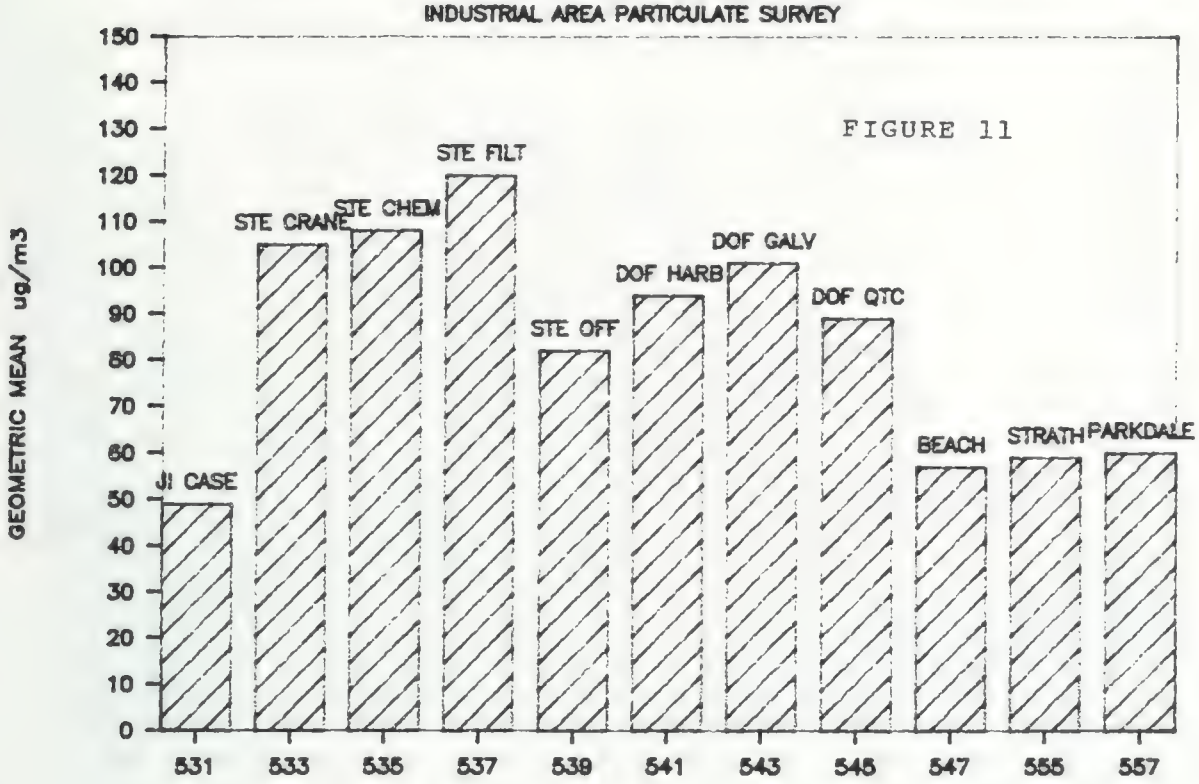


FIGURE 11

FREE CARBON IN TSP STATION MEANS

INDUSTRIAL AREA PARTICULATE SURVEY

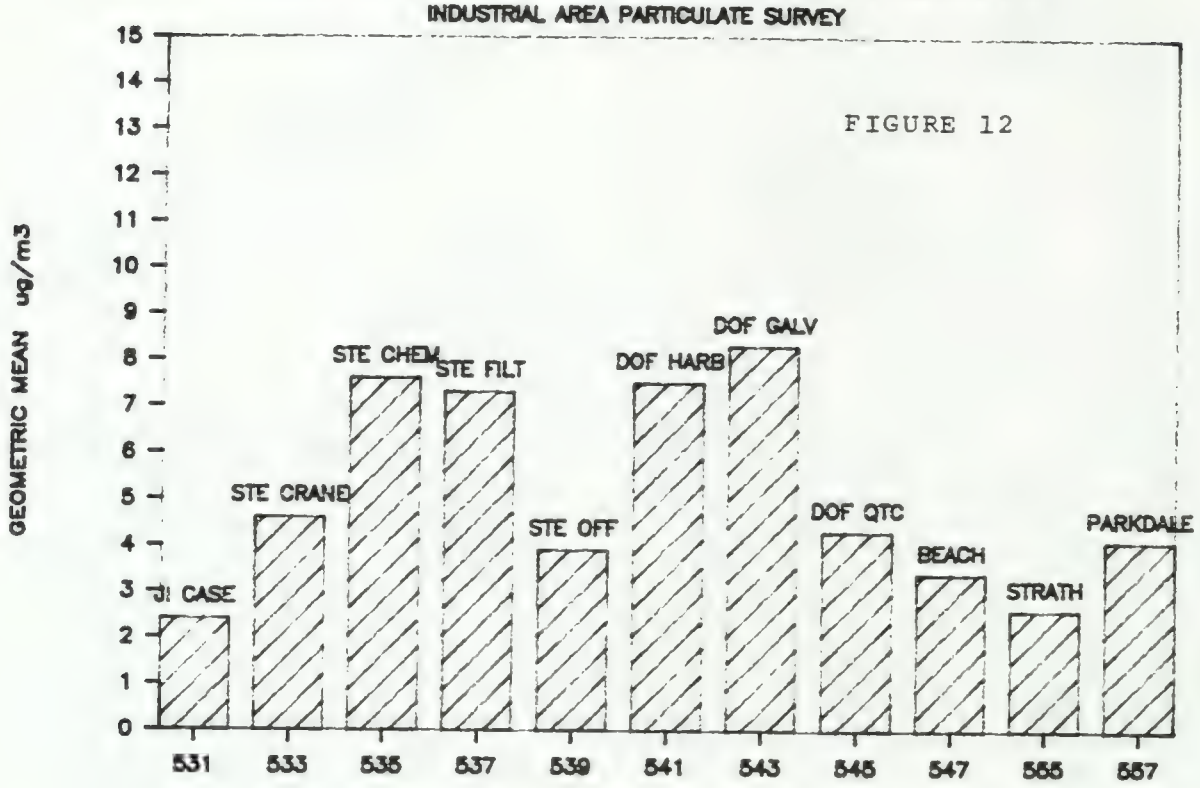


FIGURE 12

TOTAL CARBON IN TSP STATION MEANS

INDUSTRIAL AREA PARTICULATE SURVEY

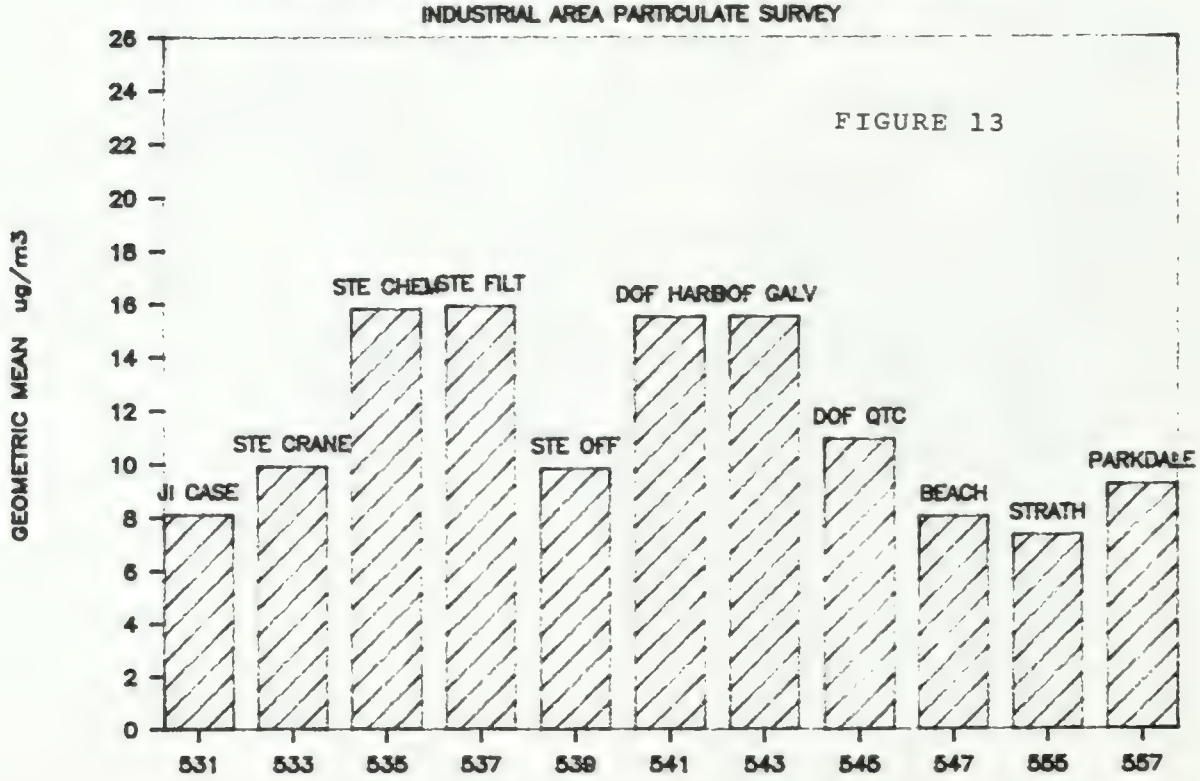


FIGURE 13

IRON IN TSP STATION MEANS

INDUSTRIAL AREA PARTICULATE SURVEY

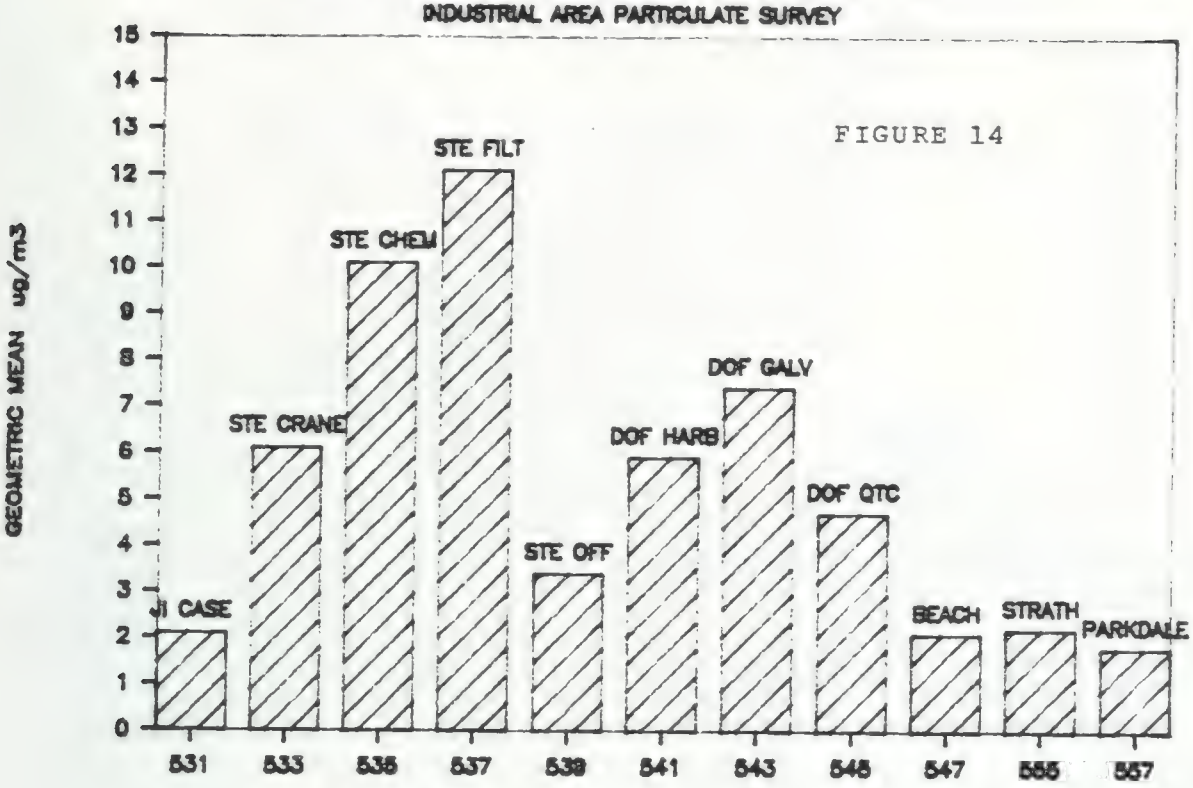


FIGURE 14

MANGANESE IN TSP STATION MEANS

INDUSTRIAL AREA PARTICULATE SURVEY

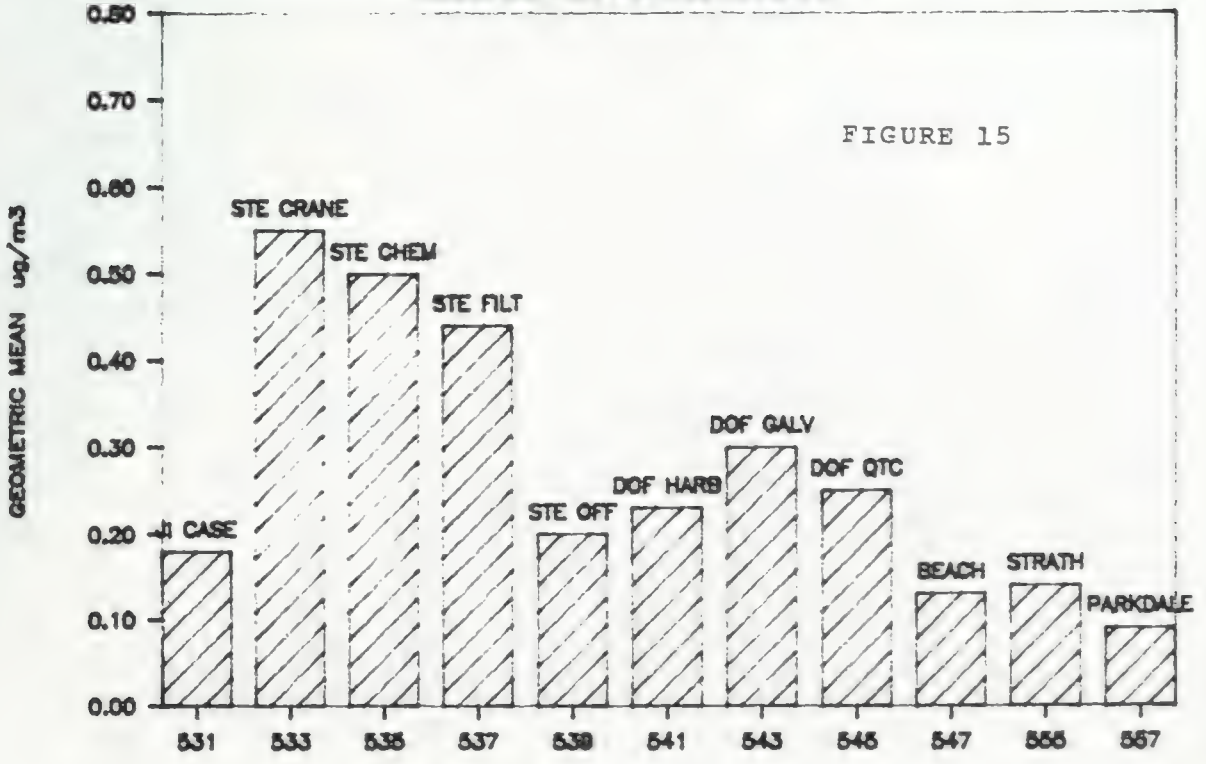


FIGURE 15

DUSTFALL STATION AVERAGES

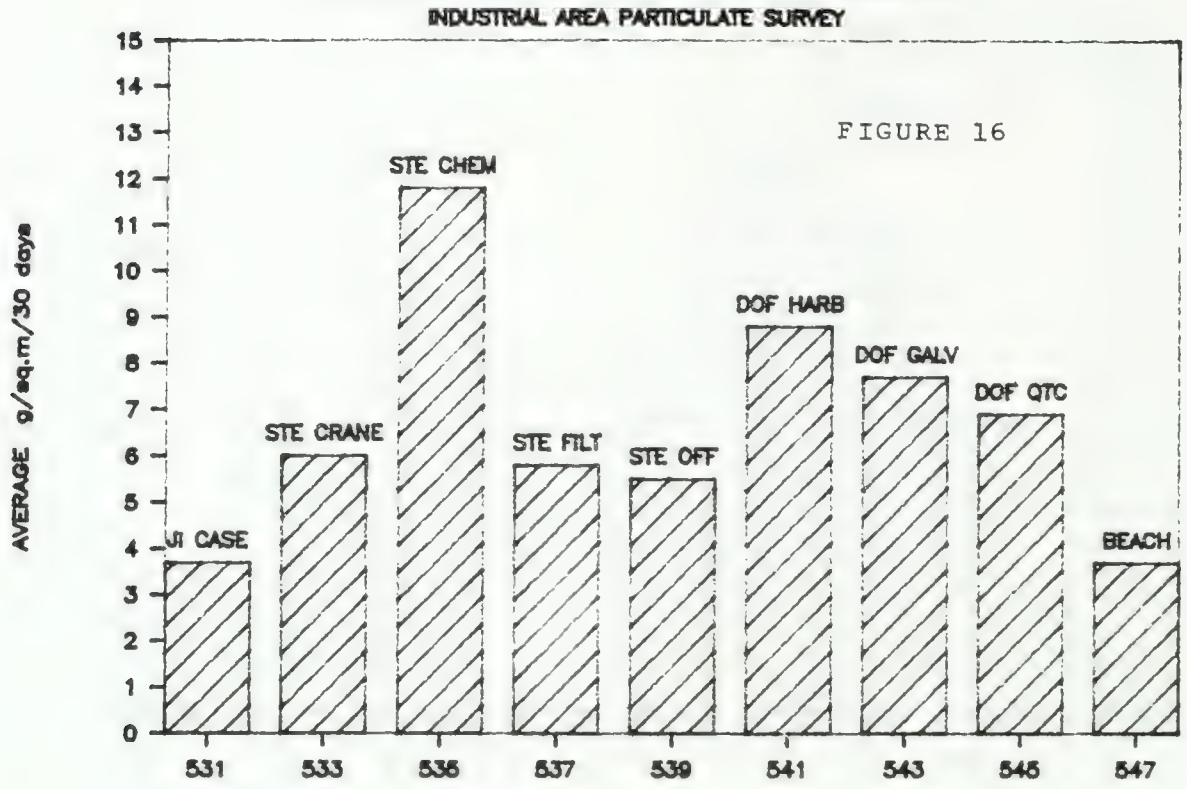


FIGURE 16

IRON IN DUSTFALL STATION AVERAGES

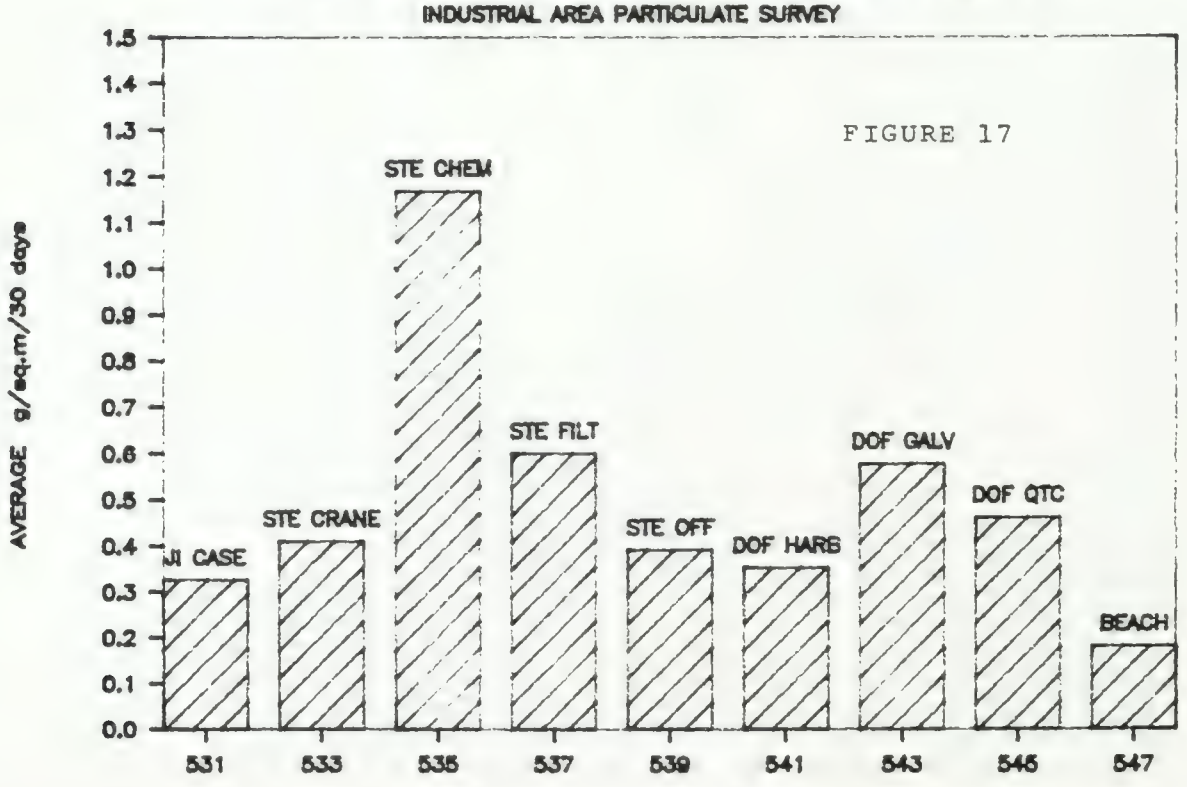


FIGURE 17

MANGANESE IN DUSTFALL STATION AVERAGES

INDUSTRIAL AREA PARTICULATE SURVEY

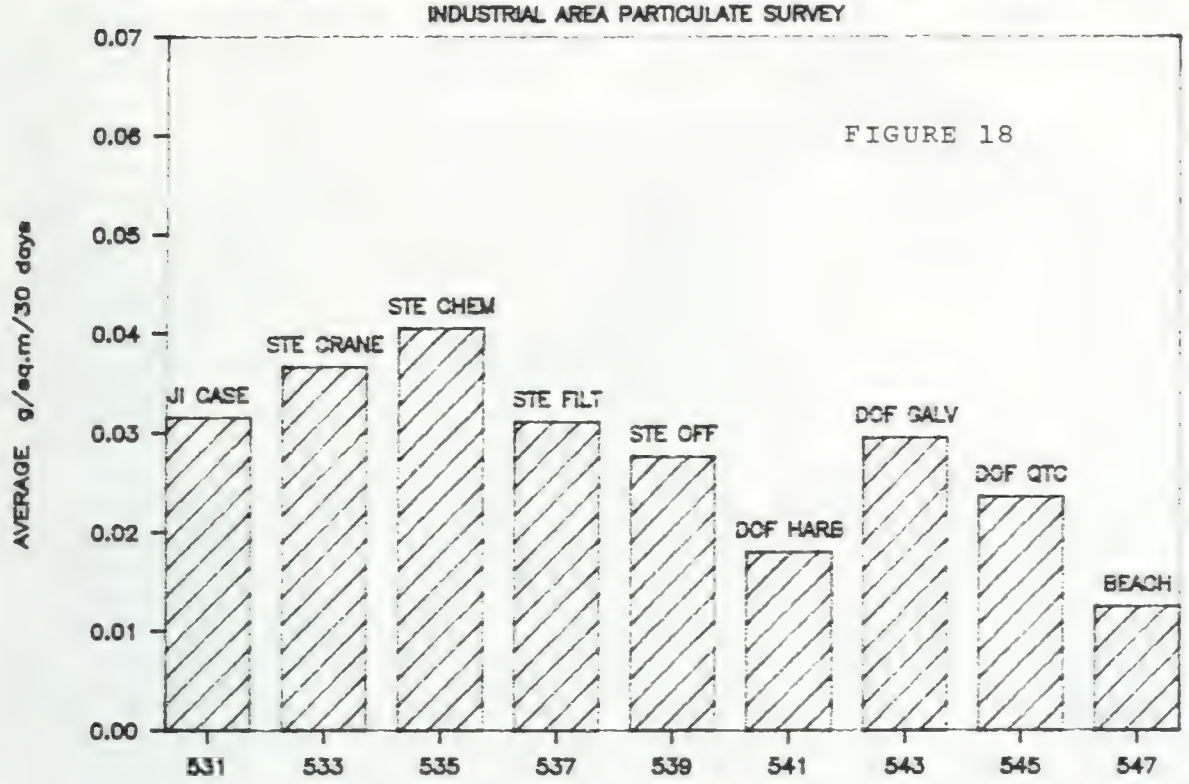


FIGURE 18

ZINC IN DUSTFALL STATION AVERAGES

INDUSTRIAL AREA PARTICULATE SURVEY

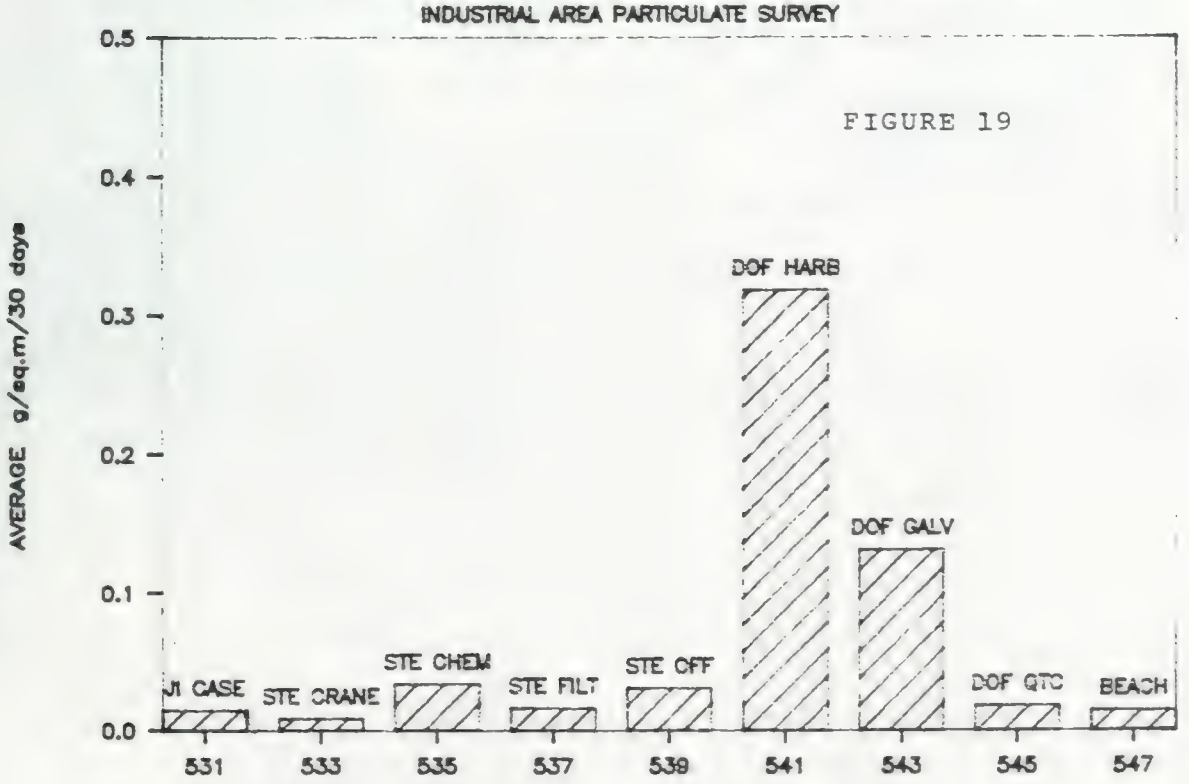


FIGURE 19

FIGURE 20

TSP Isopleths of Aug 13,1991

ug/m3 Calm conditions

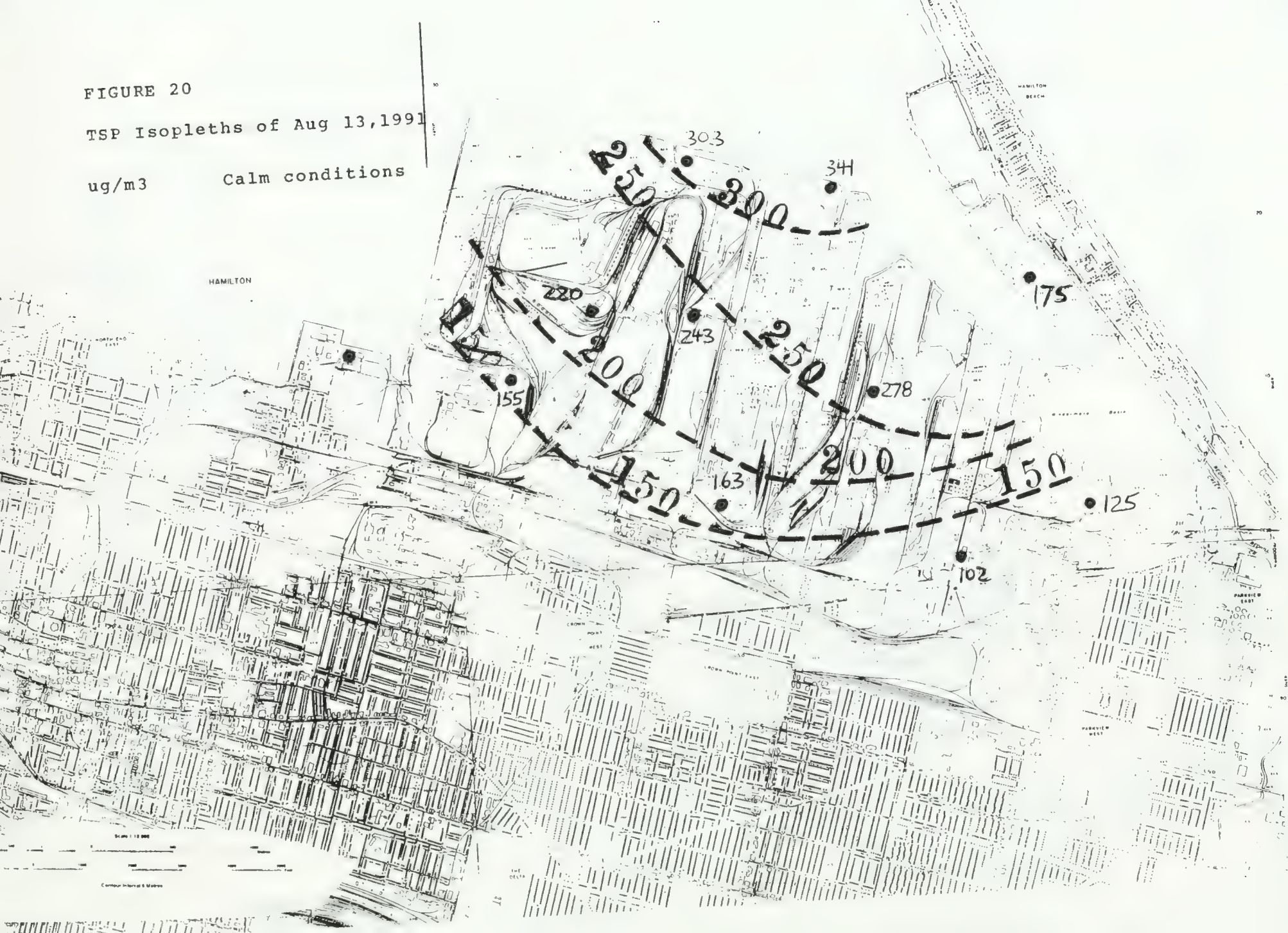


FIGURE 21

TSP Isopleths of Aug 22,1991

ug/m3 Southwest wind

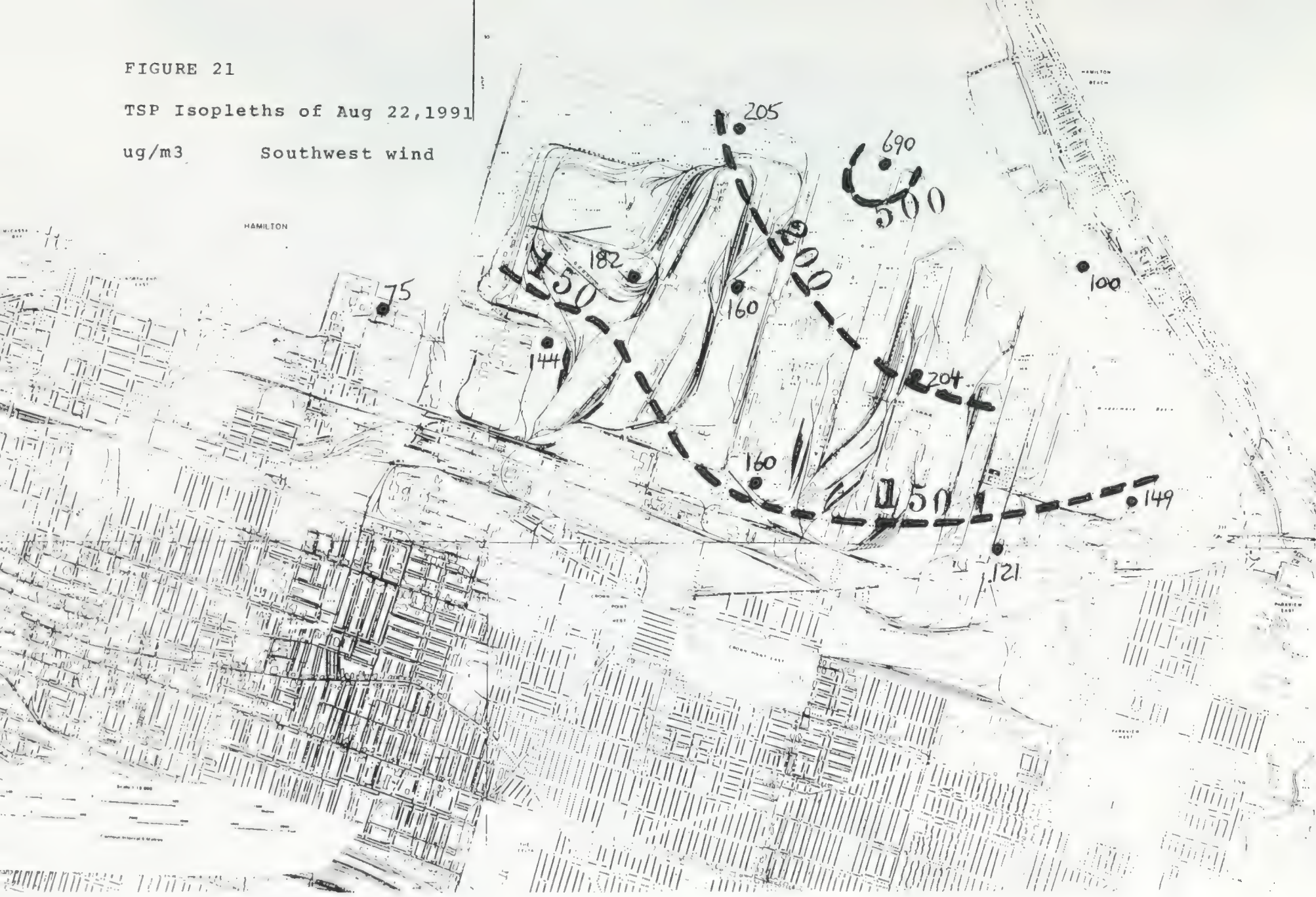
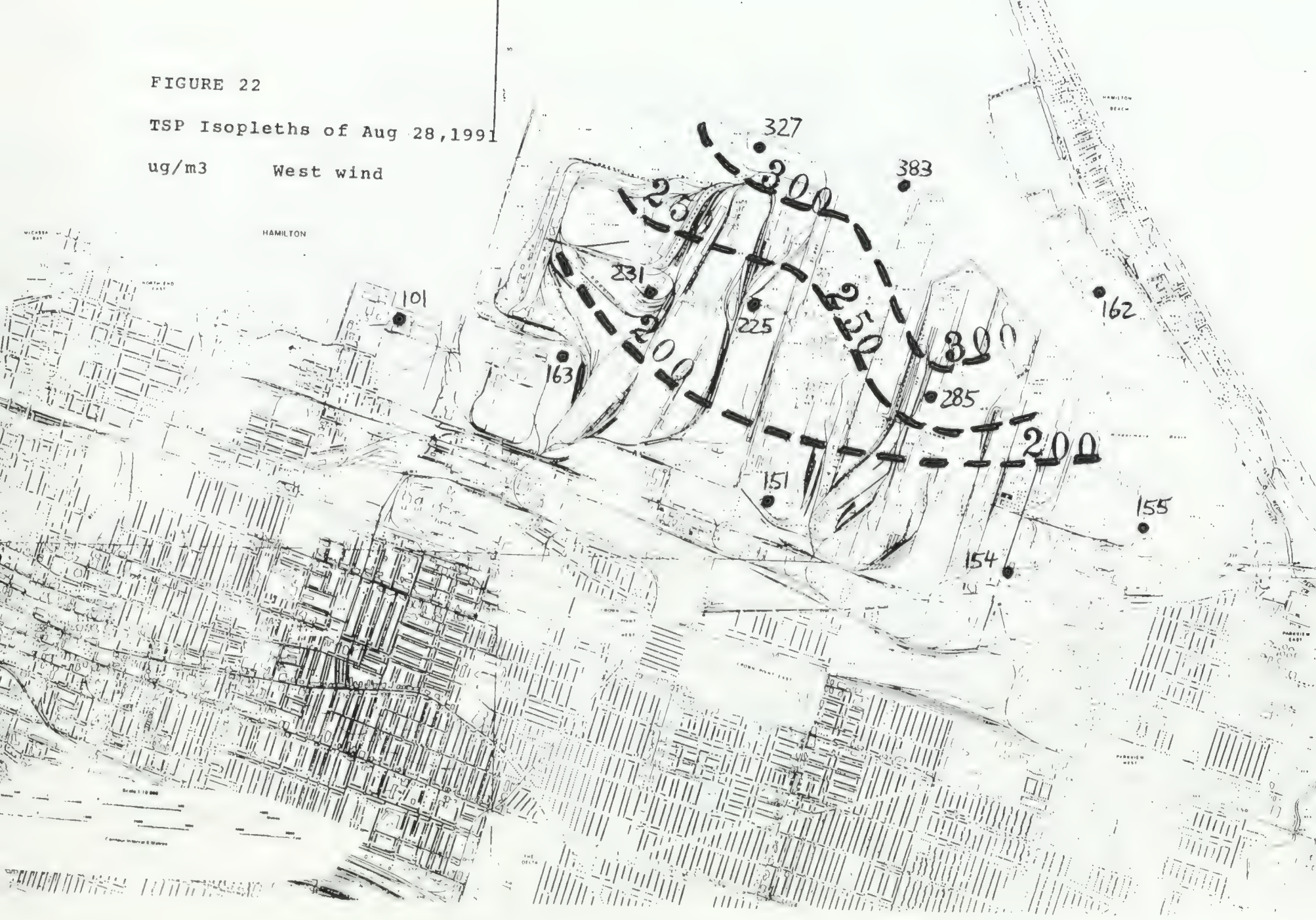


FIGURE 22

TSP Isopleths of Aug 28,1991

ug/m3 West wind



DAY VS NIGHT TSP MEANS

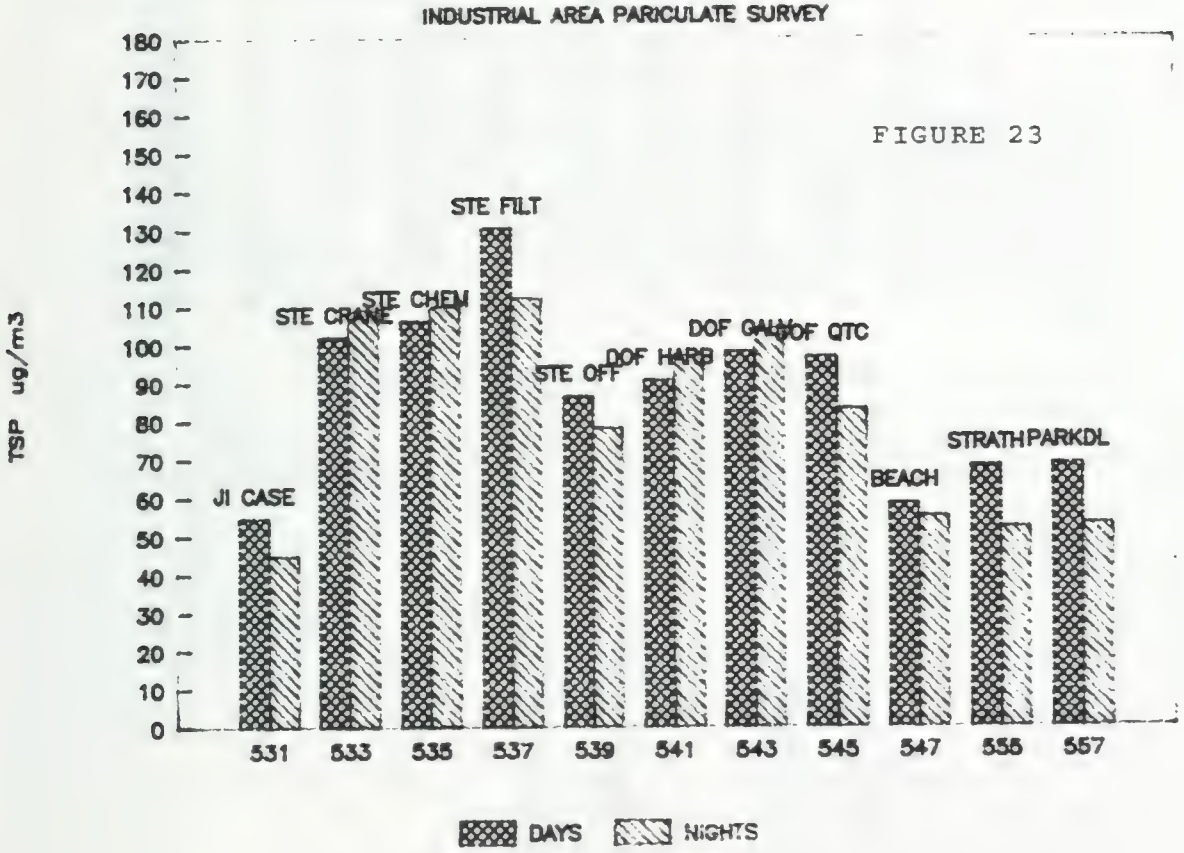
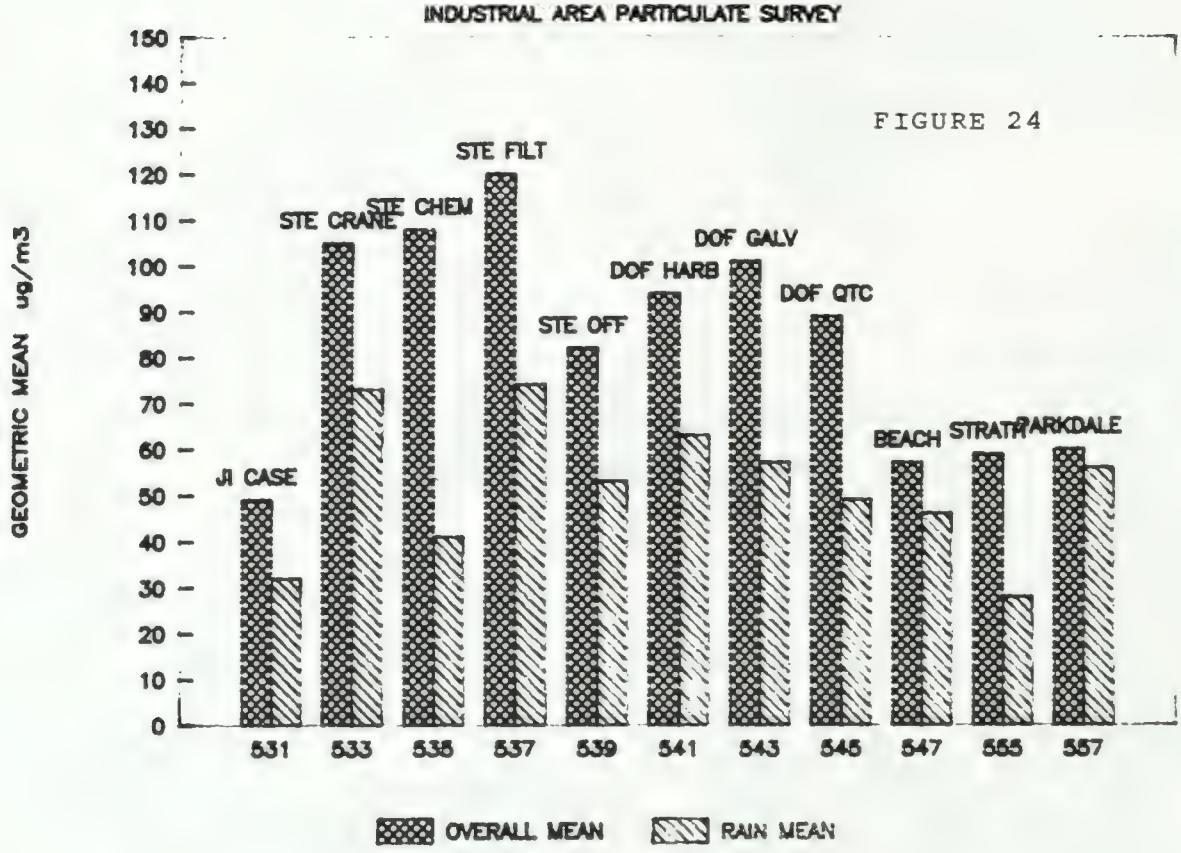


FIGURE 23

EFFECT OF RAINFALL ON TSP

INDUSTRIAL AREA PARTICULATE SURVEY

FIGURE 24



EFFECT OF RAINFALL ON FREE CARBON

INDUSTRIAL AREA PARTICULATE SURVEY

FIGURE 25

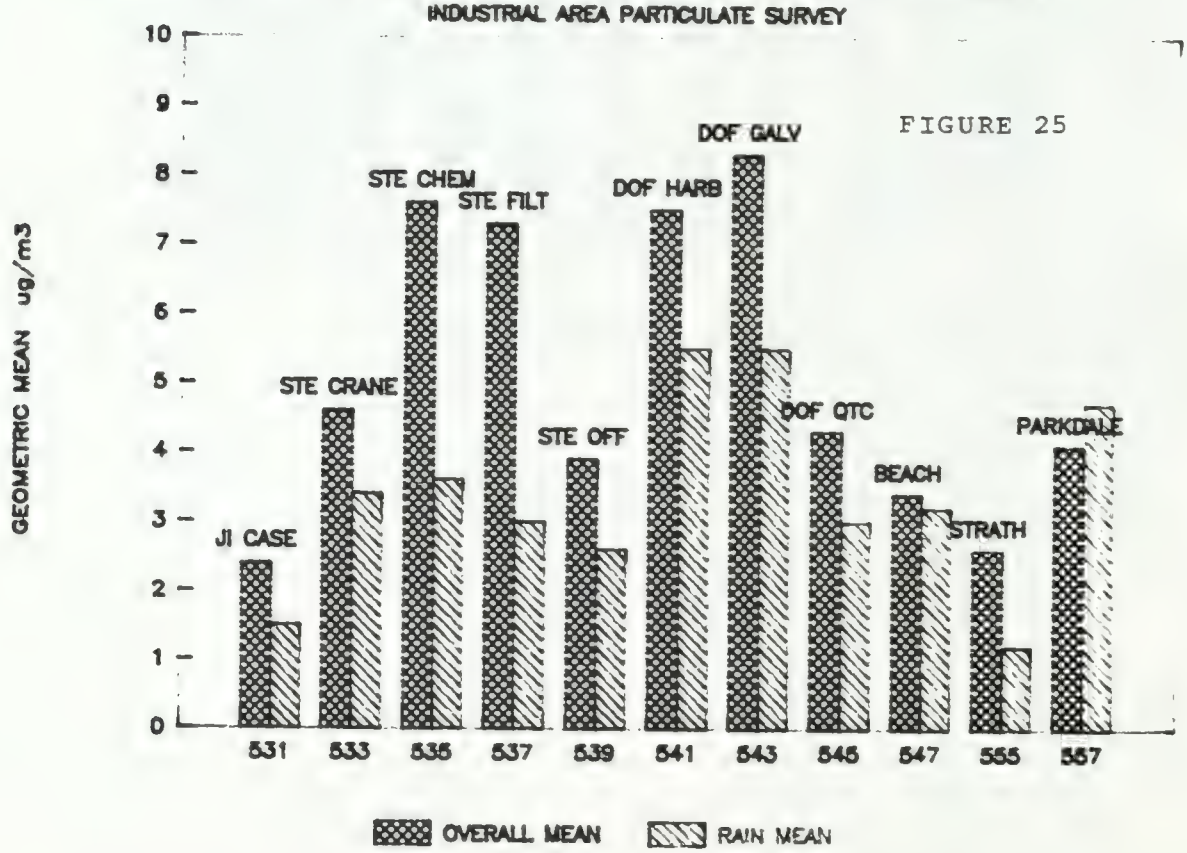


FIGURE 26

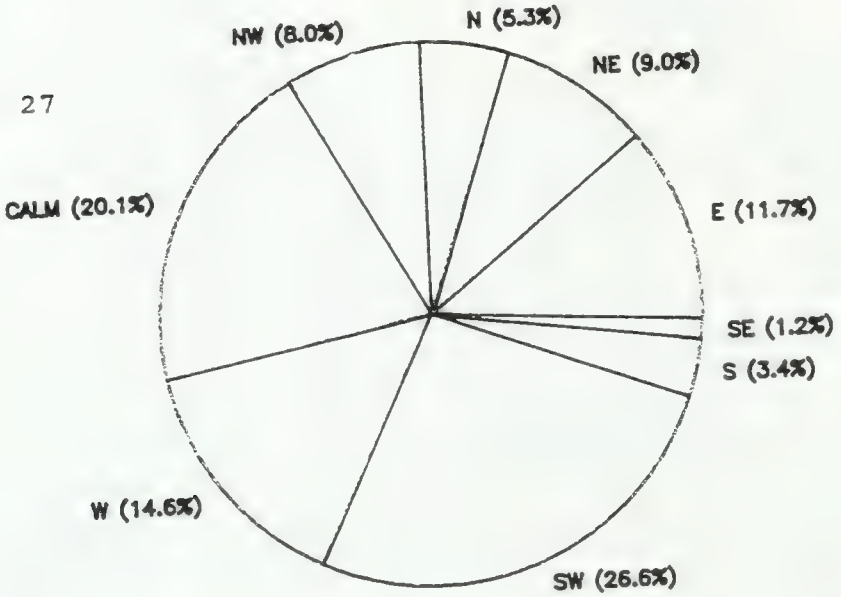
Positive Wind Correlations

Average "r" of 5 Parameters

WIND FREQUENCY DISTRIBUTION

26/07 TO 22/11 CONTINUOUS

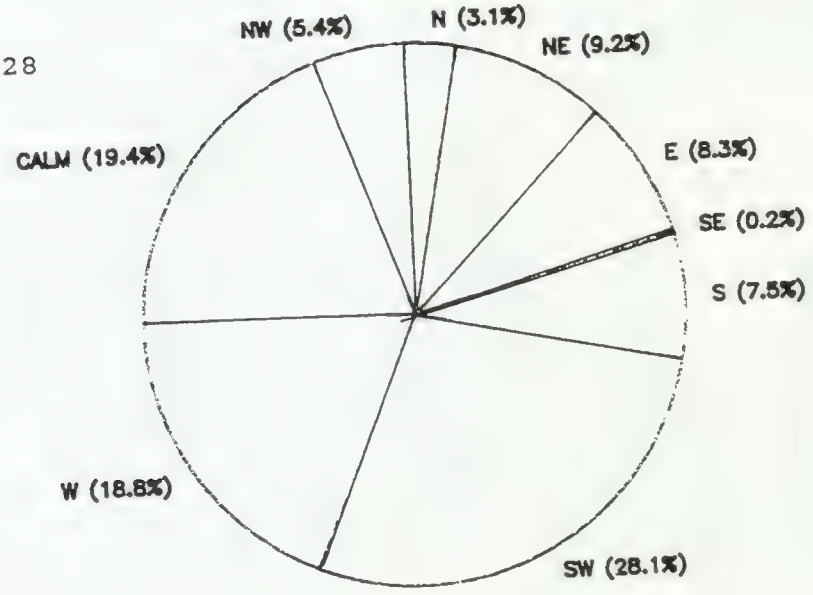
FIGURE 27

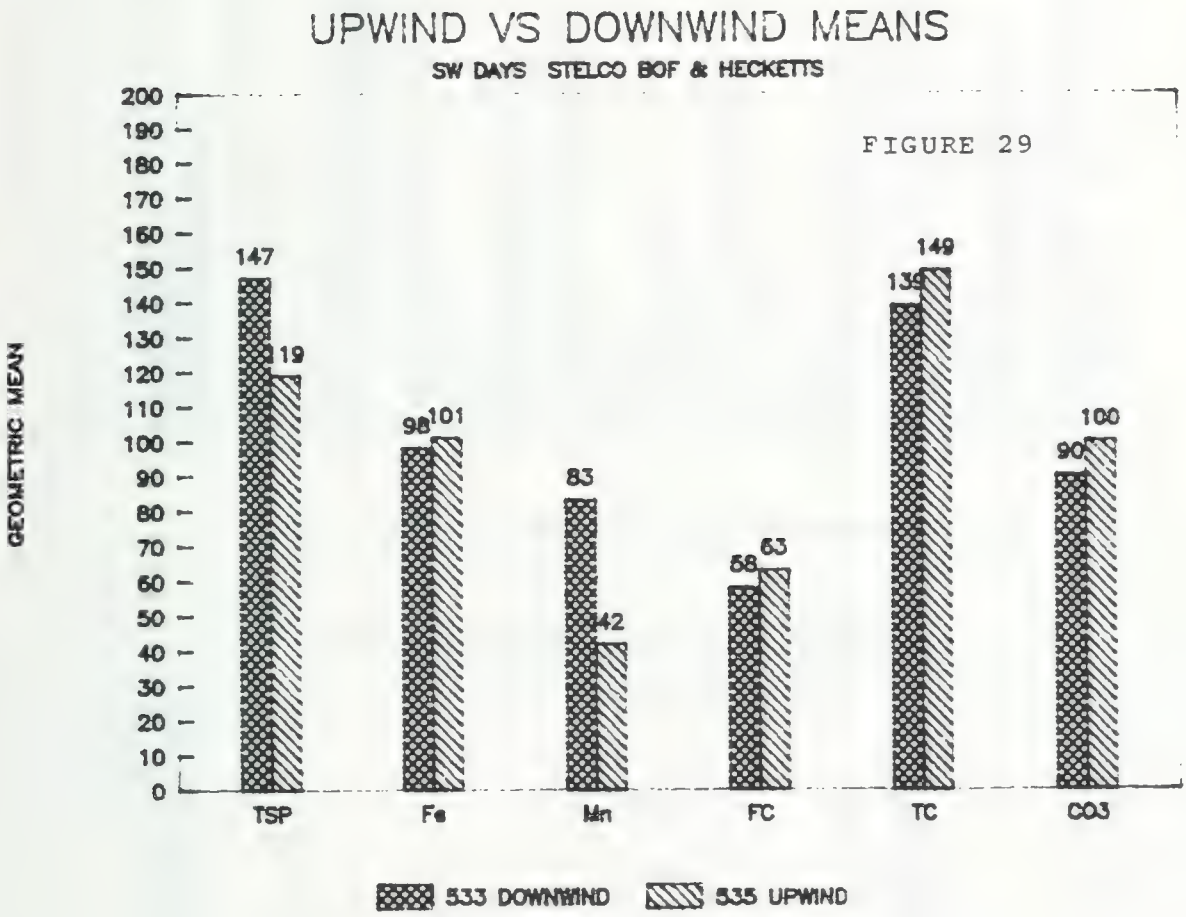


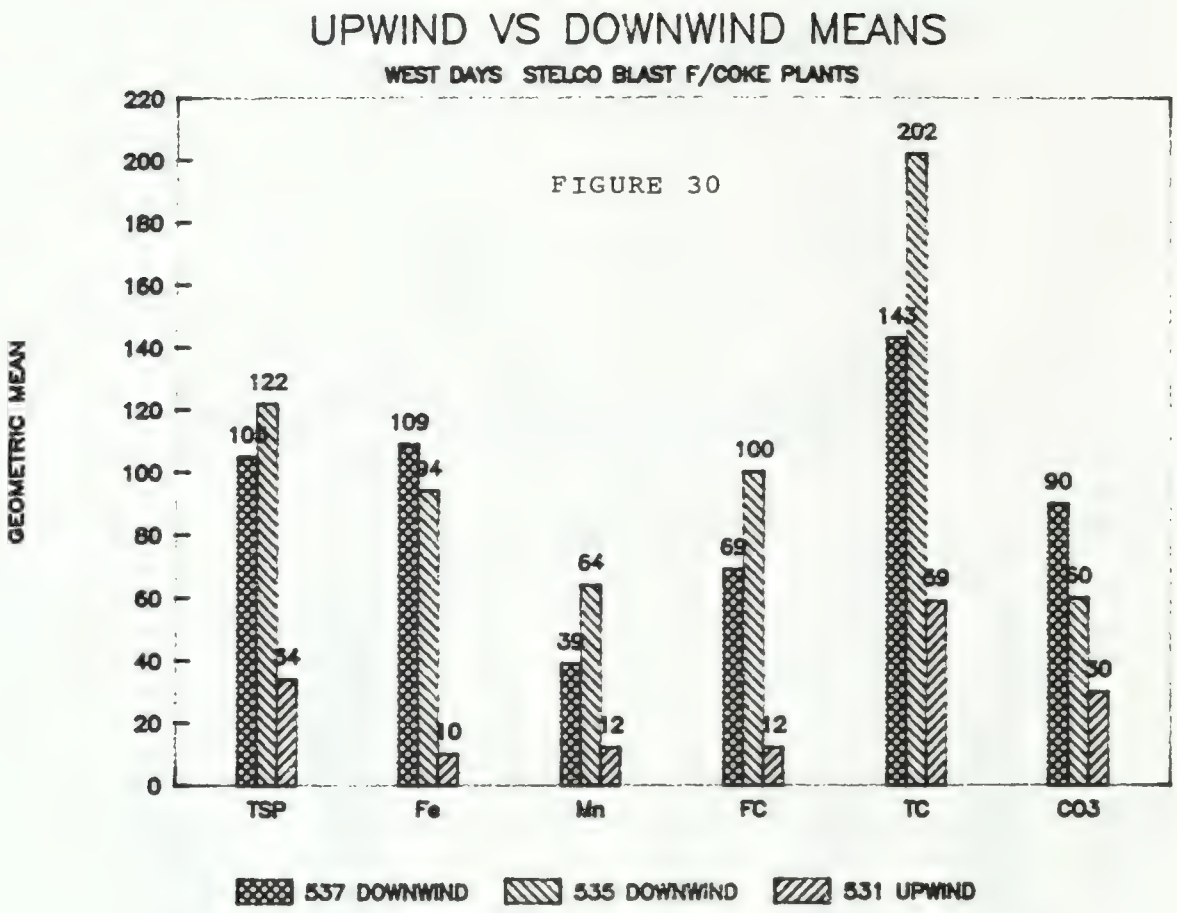
WIND FREQUENCY DISTRIBUTION

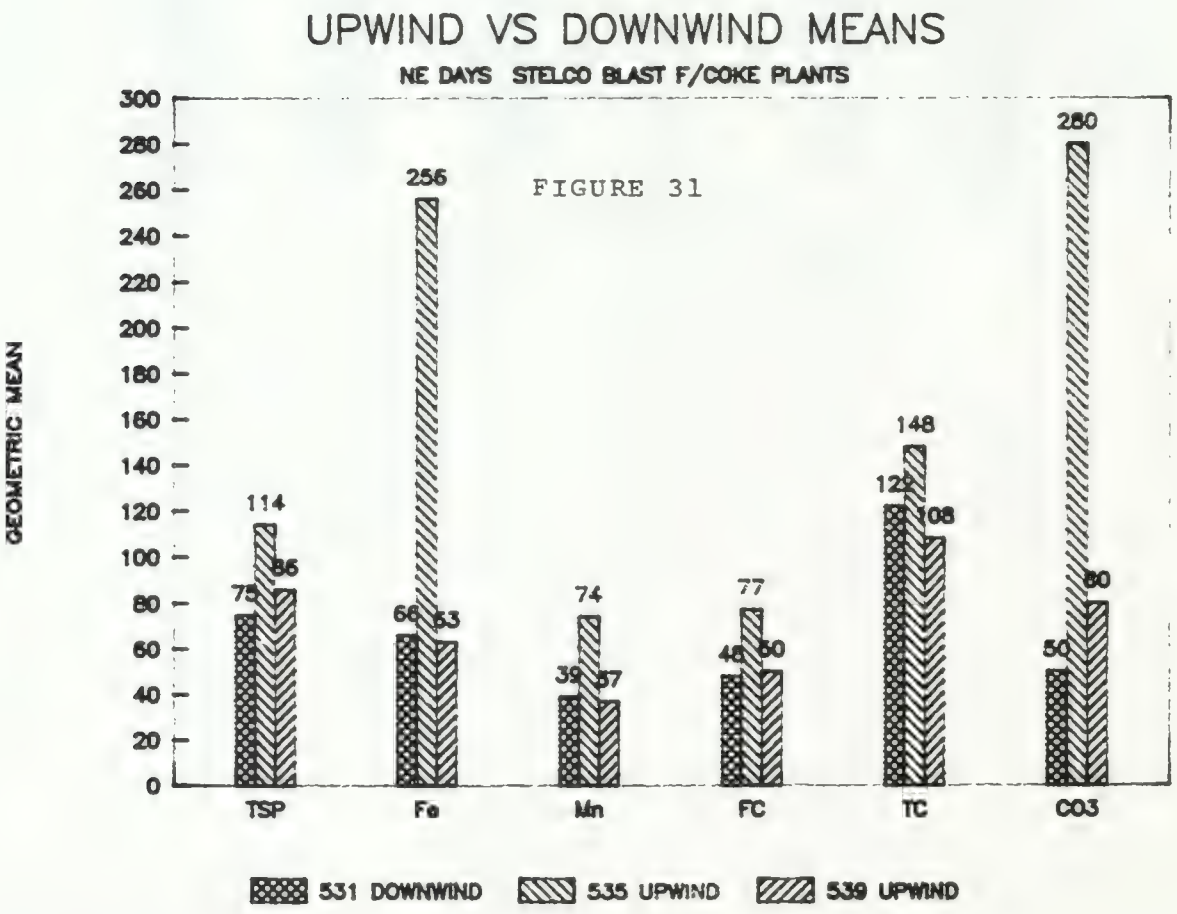
HIVOL SAMPLING PERIODS

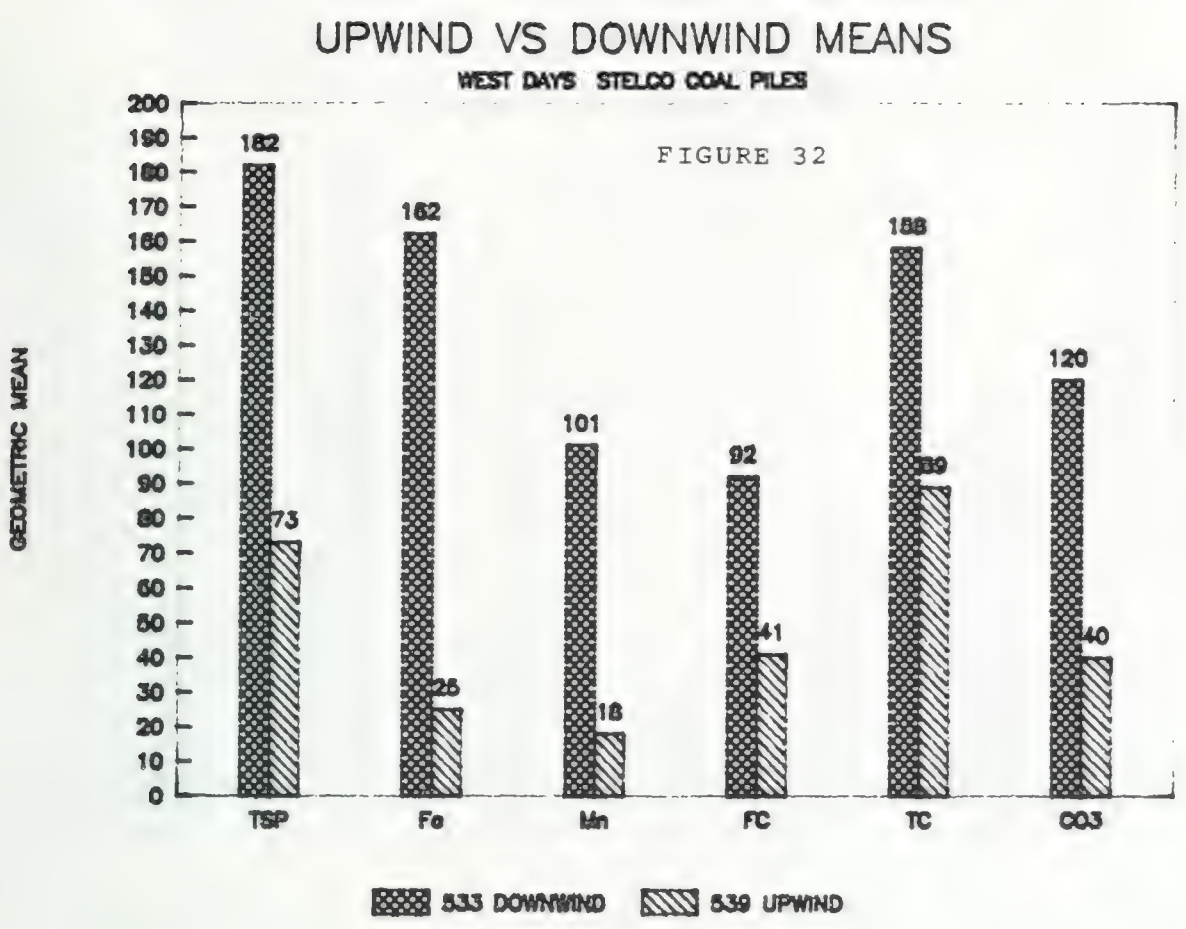
FIGURE 28

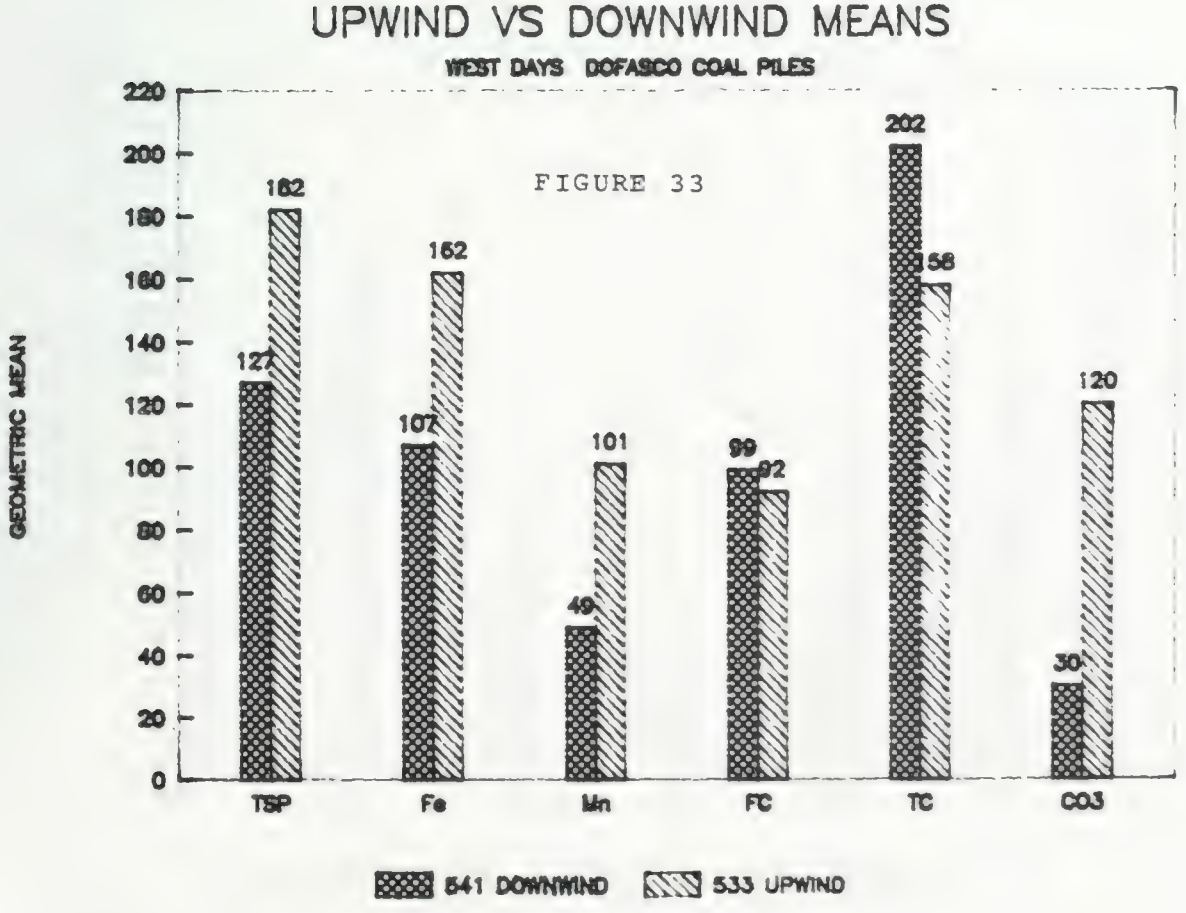



UPWIND VS DOWNWIND MEANS
SW DAYS STELCO BOF & HECKETTS
FIGURE 29
GEOMETRIC MEAN
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
147
119
98
101
83
42
58
63
139
149
90
100
TSP
Fe
Mn
FC
TC
CO3
533 DOWNWIND
535 UPWIND


UPWIND VS DOWNWIND MEANS
WEST DAYS STELCO BLAST F/COKE PLANTS
FIGURE 30
GEOMETRIC MEAN
220
200
180
160
140
120
100
80
60
40
20
0
122
106
34
109
94
10
64
39
12
100
69
12
202
143
59
90
60
30
TSP
Fe
Mn
FC
TC
CO3
537 DOWNWIND
535 DOWNWIND
531 UPWIND


UPWIND VS DOWNWIND MEANS
NE DAYS STELCO BLAST F/COKE PLANTS
FIGURE 31
GEOMETRIC MEAN
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
114
75
86
256
66
63
74
39
57
77
48
60
148
122
108
280
50
80
TSP
Fe
Mn
FC
TC
CO3
531 DOWNWIND
535 UPWIND
539 UPWIND


UPWIND VS DOWNWIND MEANS
WEST DAYS STELCO COAL PILES
FIGURE 32
GEOMETRIC MEAN
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
182
73
162
26
101
18
92
41
158
89
120
40
TSP
Fe
Mn
FC
TC
CO3
533 DOWNWIND
539 UPWIND


UPWIND VS DOWNWIND MEANS
WEST DAYS DOFASCO COAL PILES
FIGURE 33
GEOMETRIC MEAN
220
200
180
160
140
120
100
80
60
40
20
0
127
182
107
162
49
101
99
92
202
158
30
120
TSP
Fe
Mn
FC
TC
CO3
541 DOWNWIND
533 UPWIND

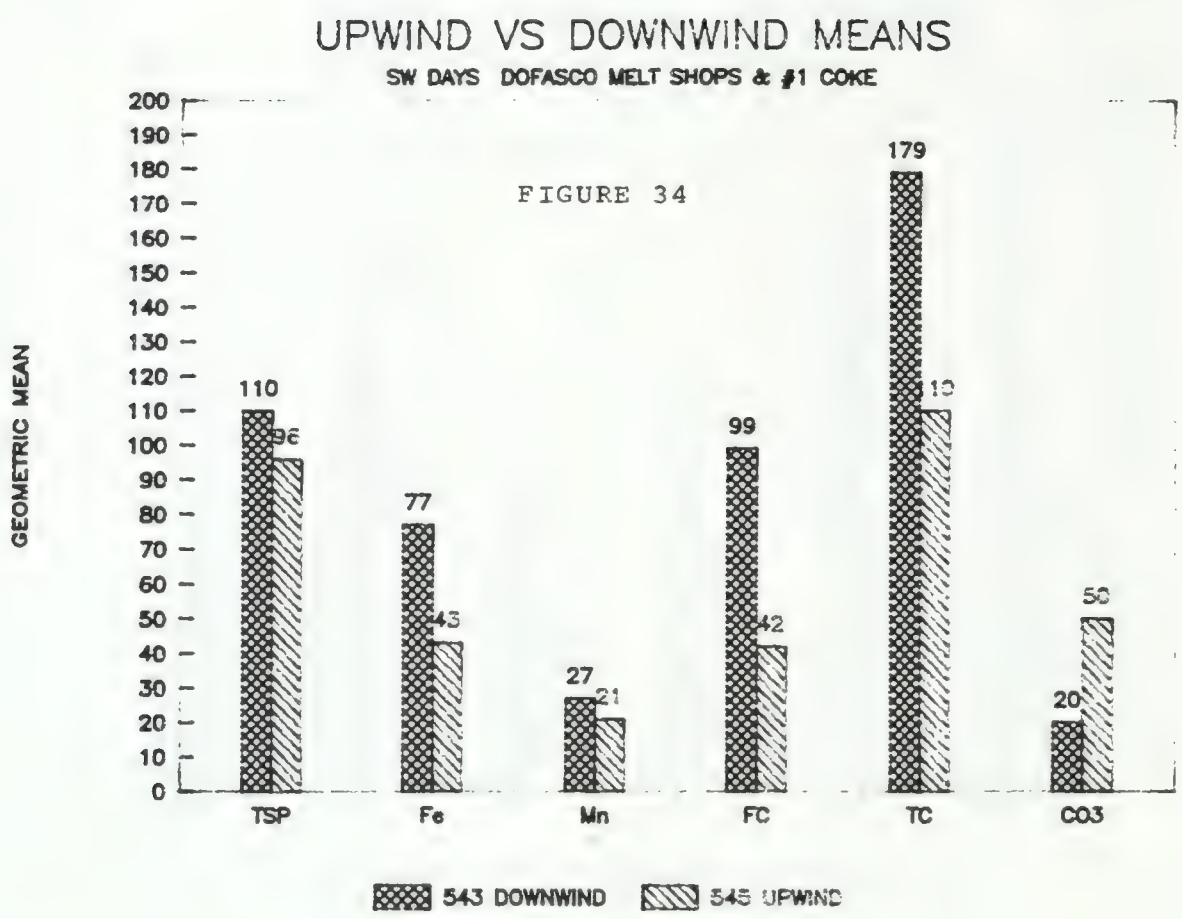


FIGURE 34

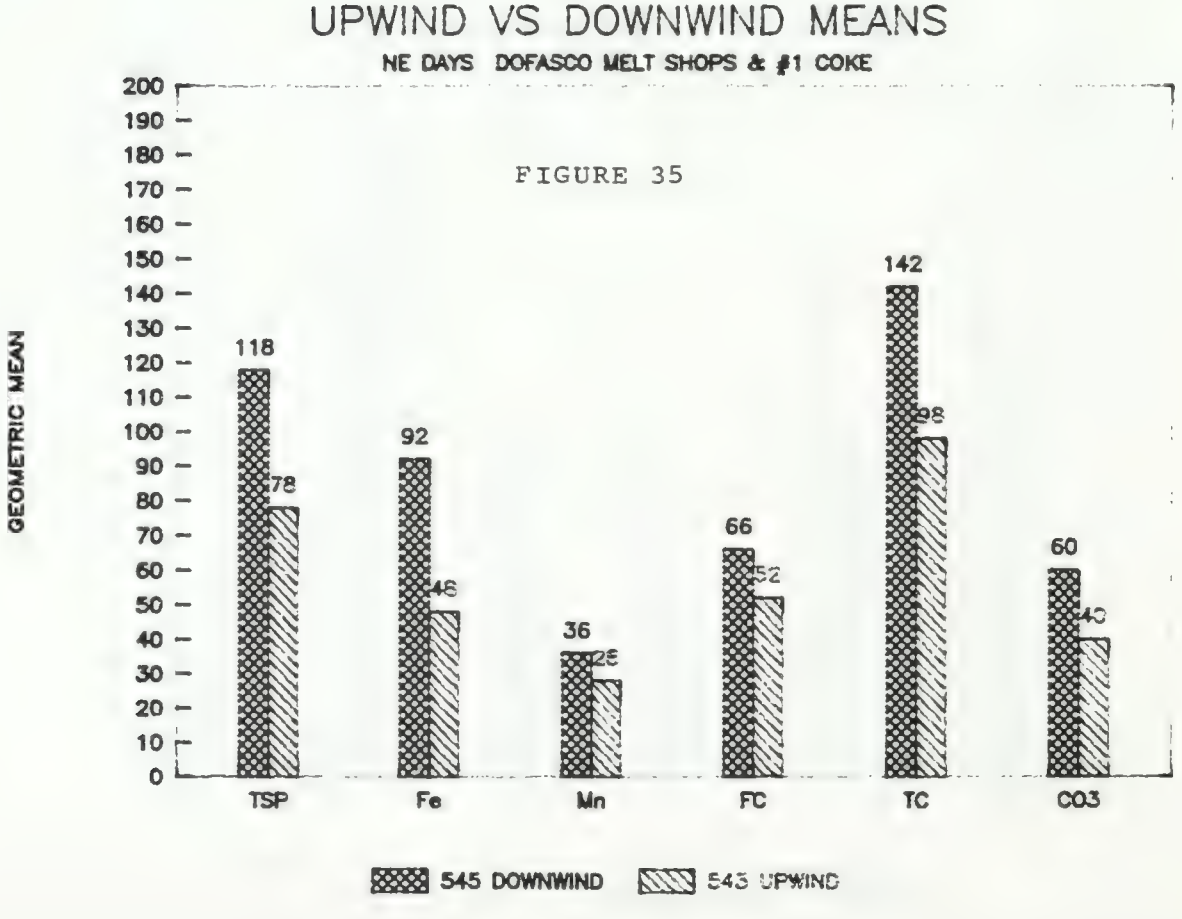
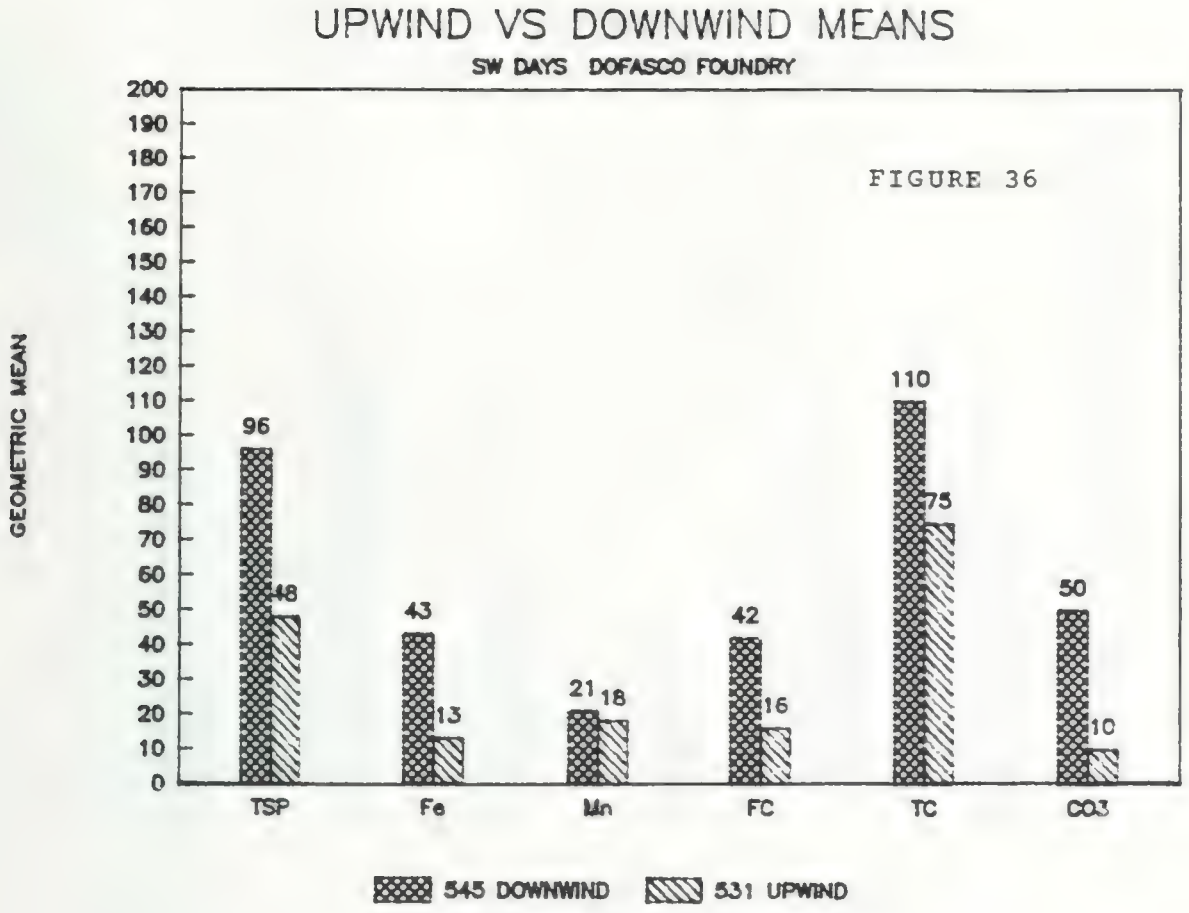
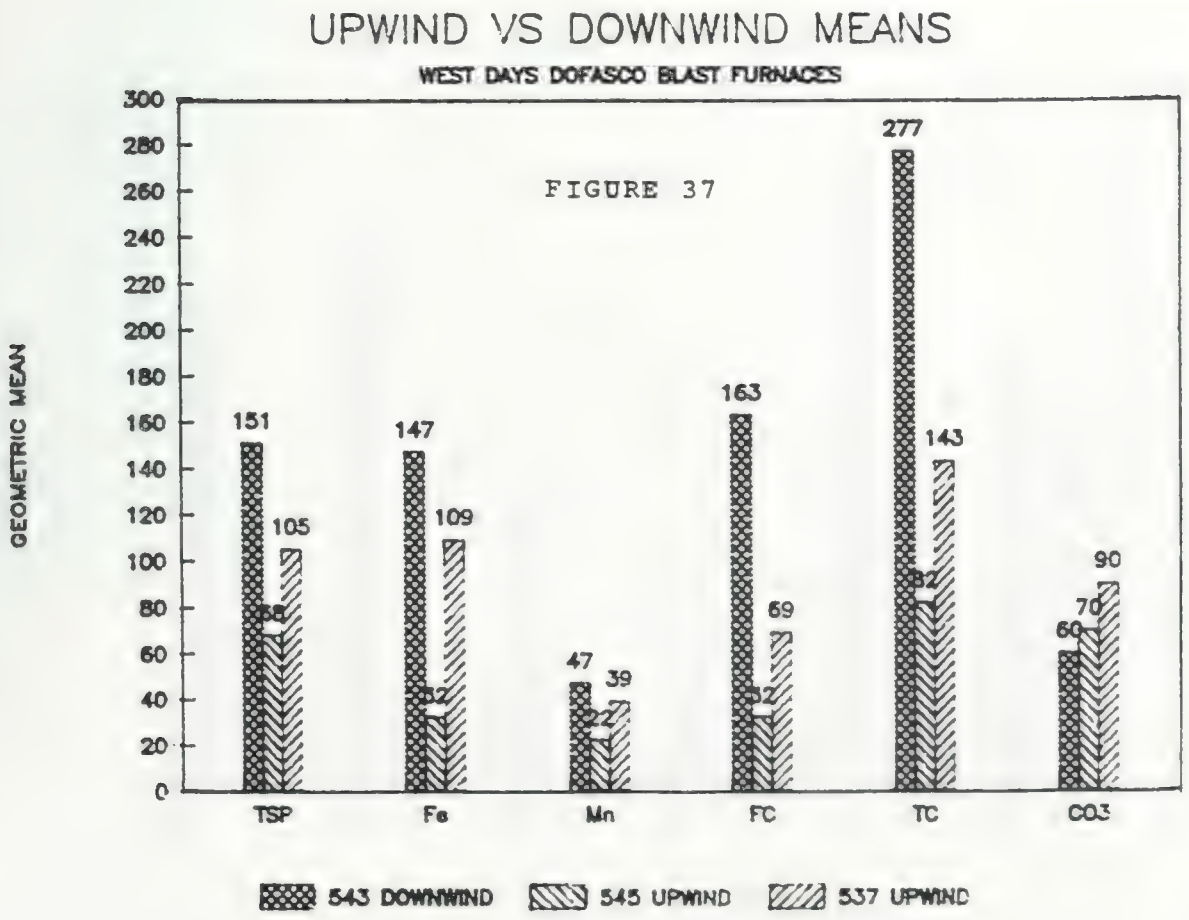


FIGURE 35


UPWIND VS DOWNWIND MEANS
SW DAYS DOFASCO FOUNDRY
FIGURE 36
GEOMETRIC MEAN
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
96
48
43
13
21
18
42
16
110
75
50
10
TSP
Fe
Mn
FC
TC
CO3
545 DOWNWIND
531 UPWIND


UPWIND VS DOWNWIND MEANS
WEST DAYS DOFASCO BLAST FURNACES
FIGURE 37
GEOMETRIC MEAN
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
151
105
147
109
47
39
163
69
277
143
60
90
TSP
Fe
Mn
FC
TC
CO3
543 DOWNWIND
545 UPWIND
537 UPWIND

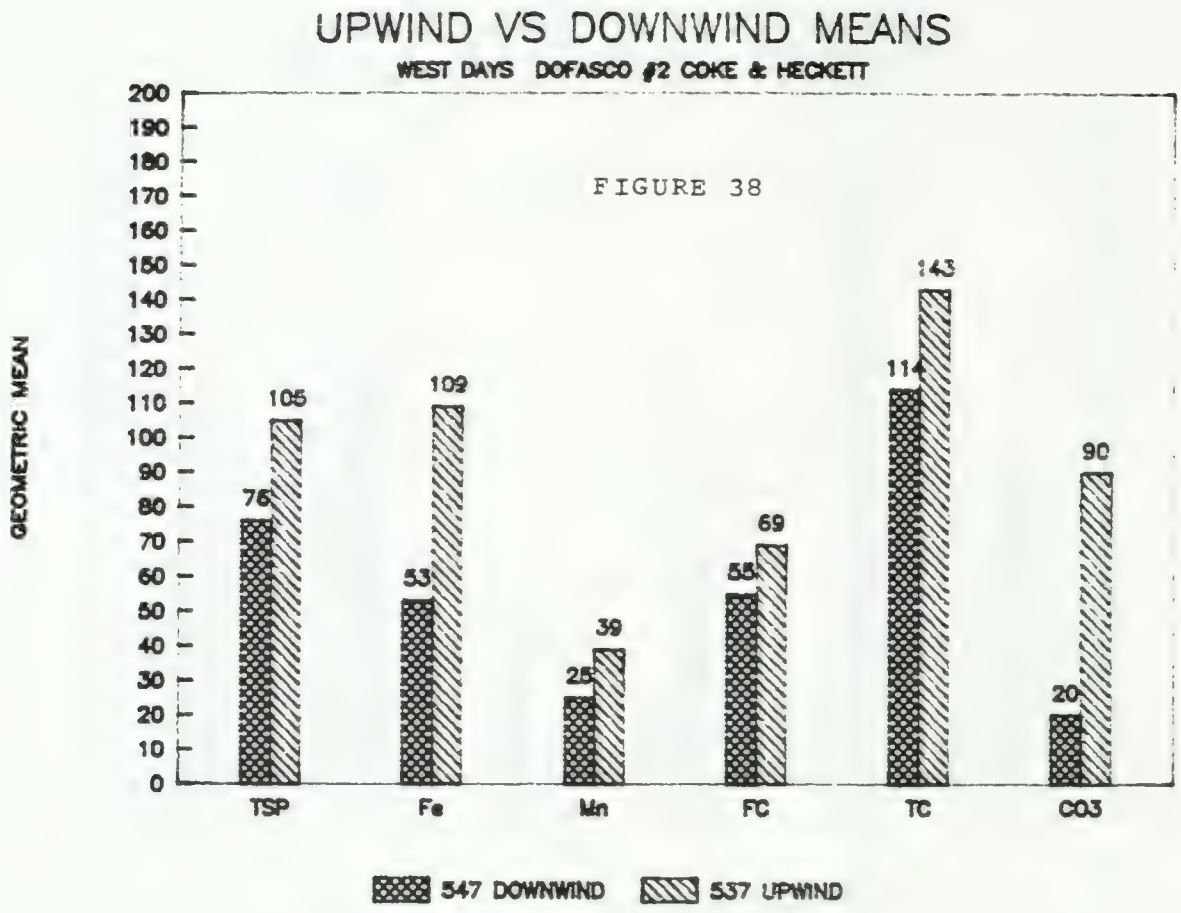


FIGURE 38

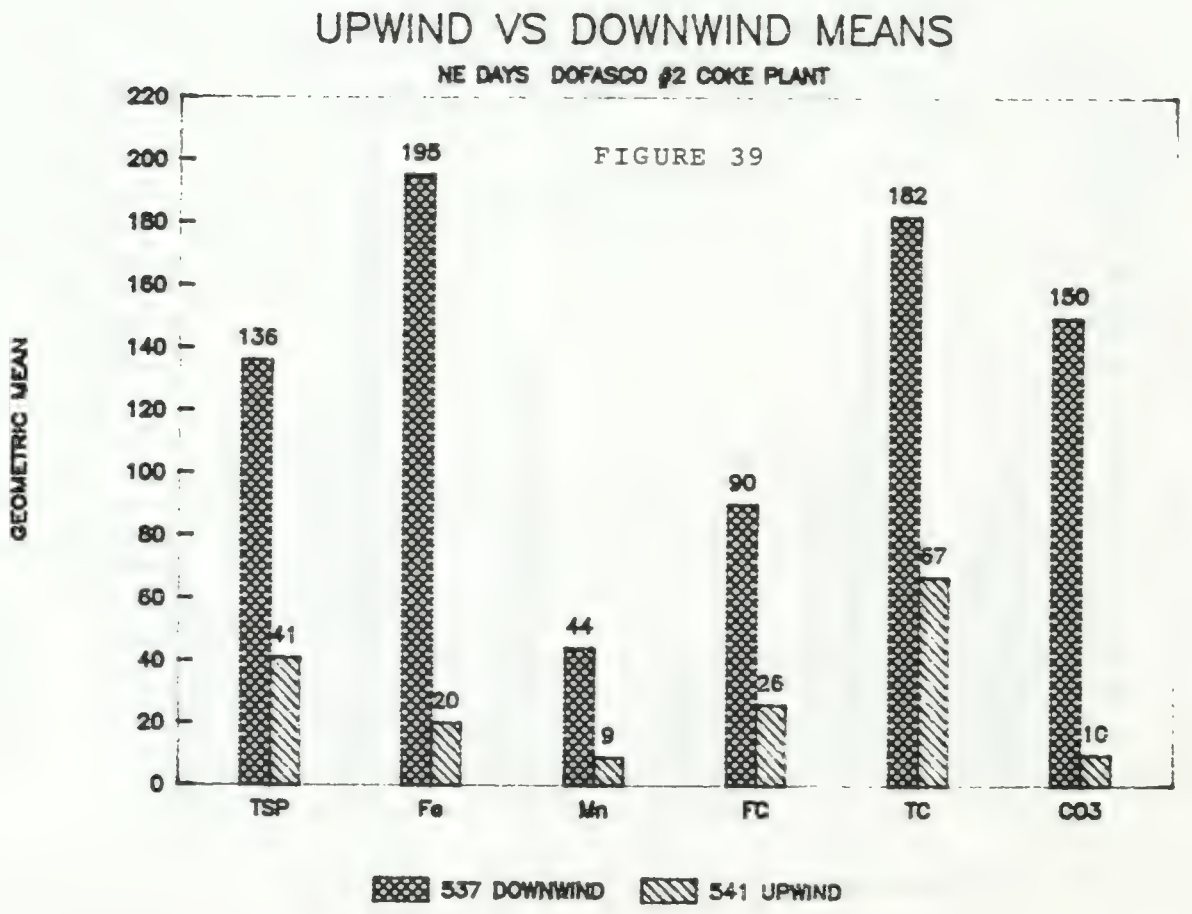
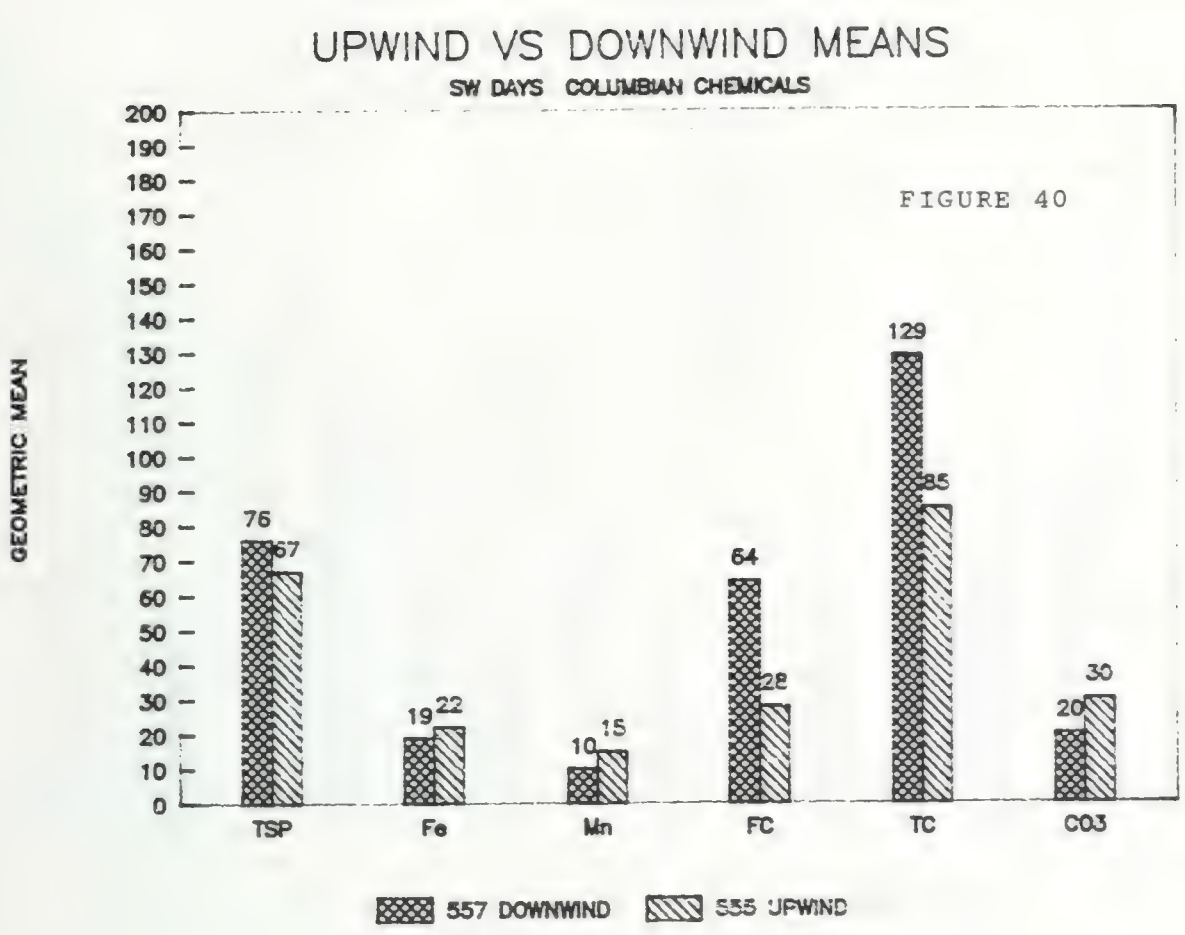
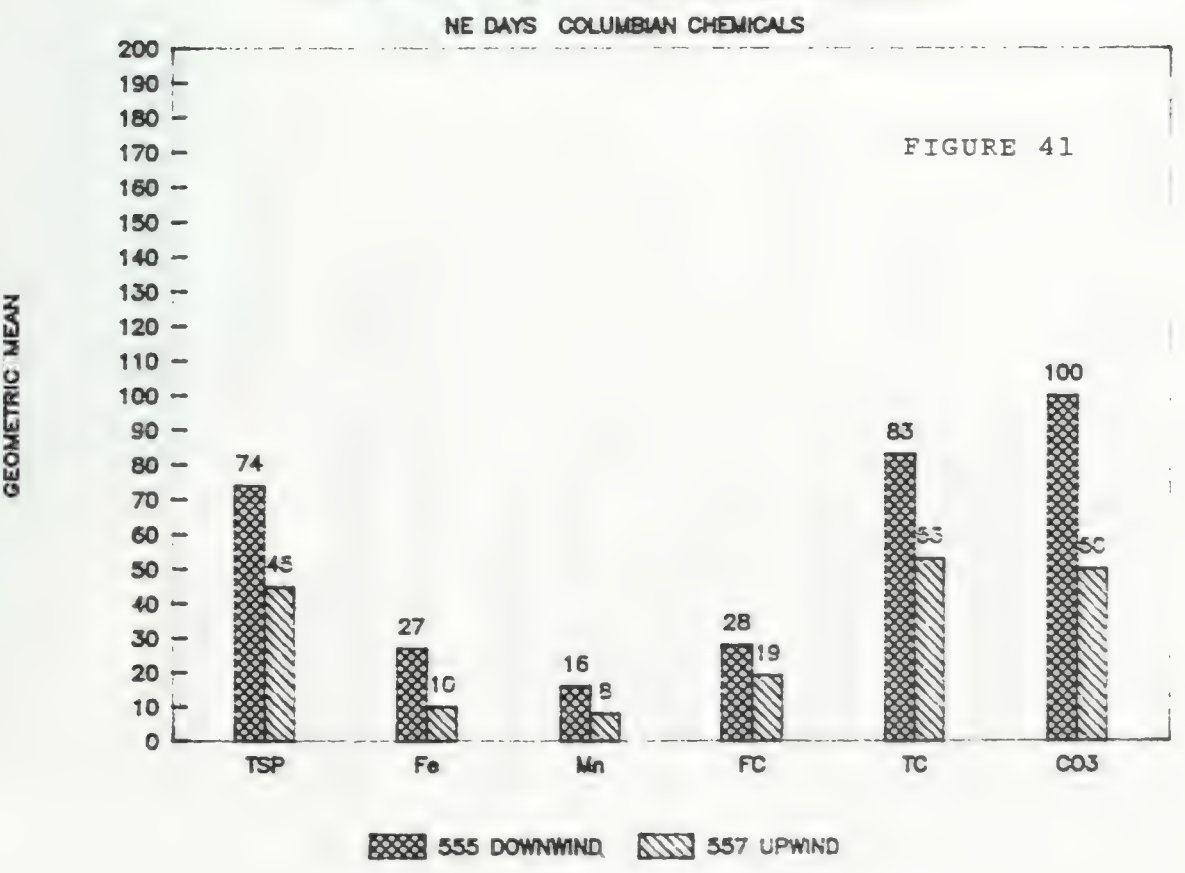
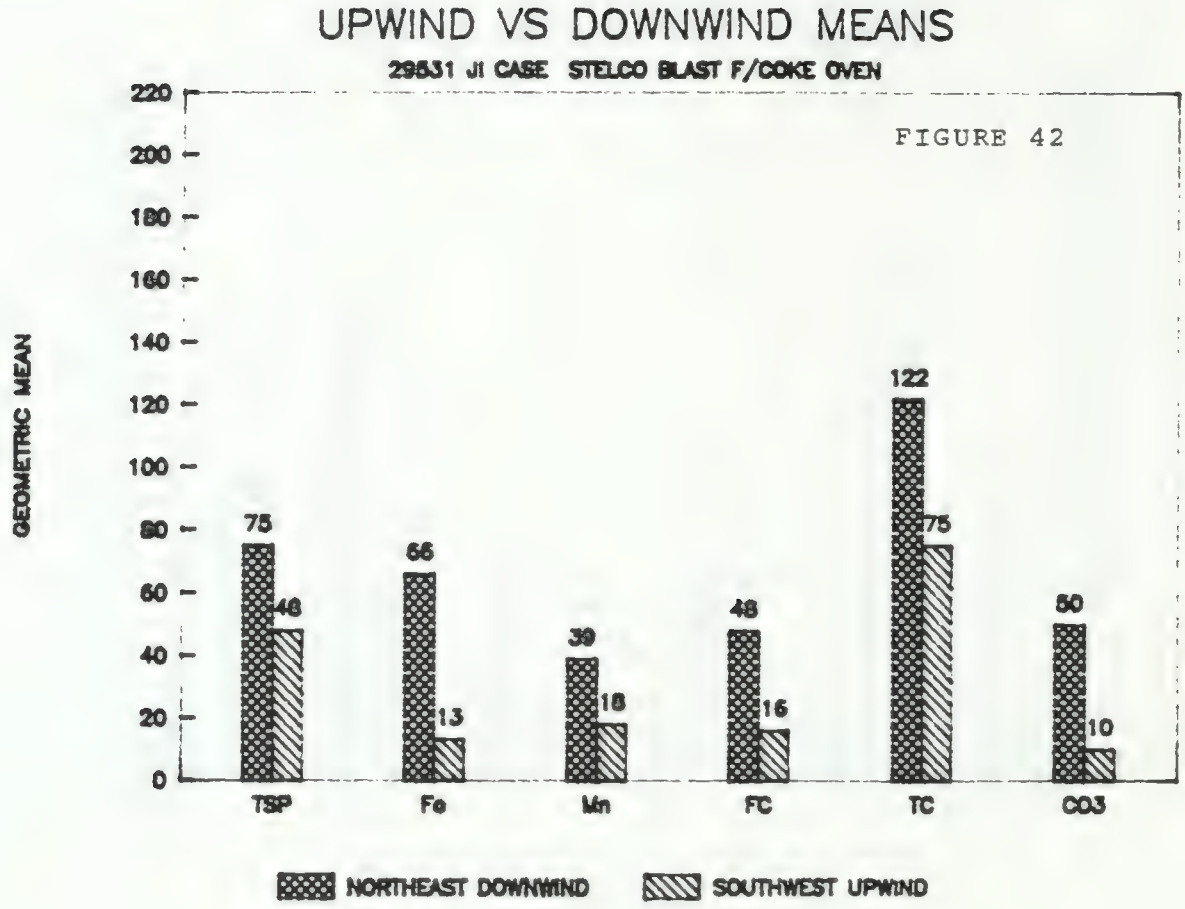
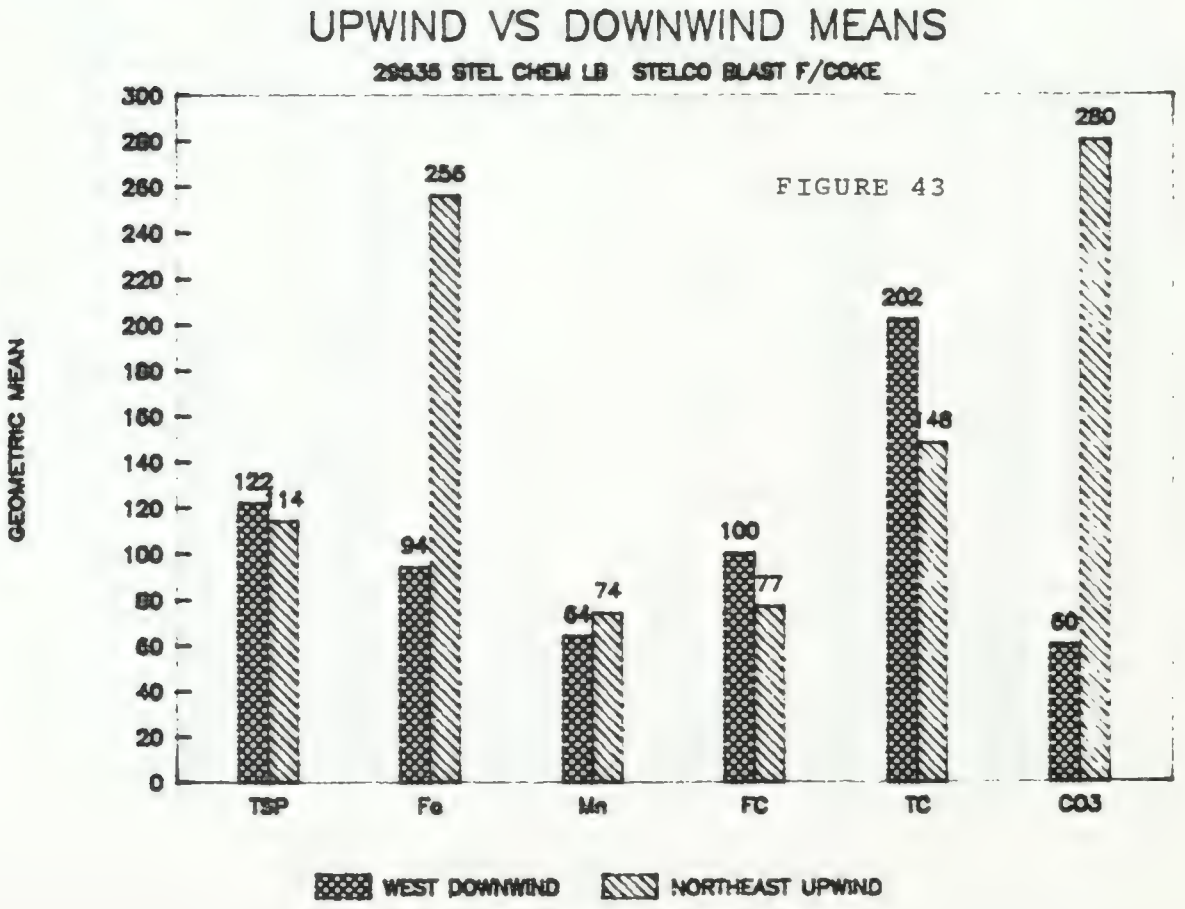


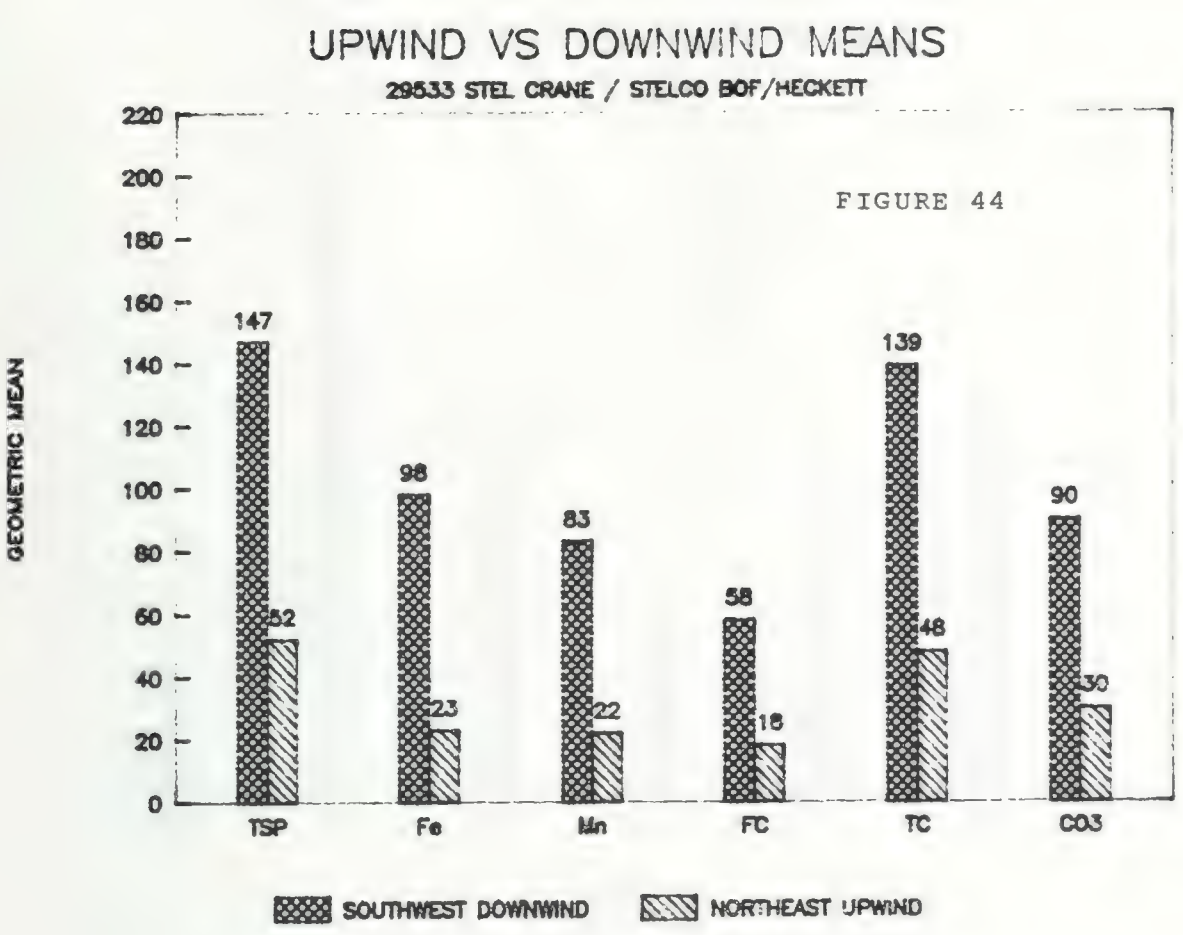
FIGURE 39

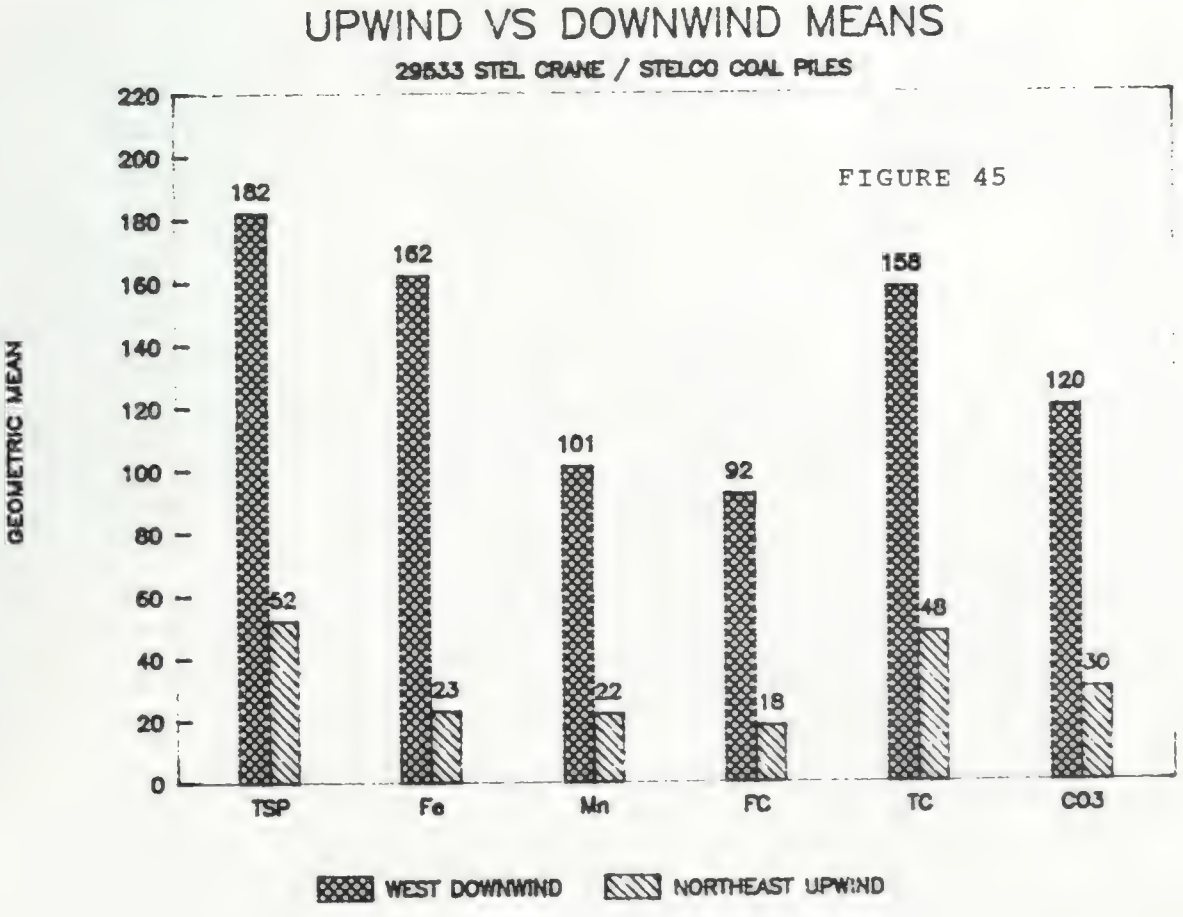

UPWIND VS DOWNWIND MEANS
SW DAYS COLUMBIAN CHEMICALS
FIGURE 40
GEOMETRIC MEAN
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
76
67
19
22
10
15
64
28
129
85
20
30
TSP
Fe
Mn
FC
TC
C03
557 DOWNWIND
555 UPWIND


UPWIND VS DOWNWIND MEANS
NE DAYS COLUMBIAN CHEMICALS
FIGURE 41
GEOMETRIC MEAN
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
74
45
27
10
16
8
28
19
83
53
100
50
TSP
Fe
Mn
FC
TC
C03
555 DOWNWIND
557 UPWIND


UPWIND VS DOWNWIND MEANS
29531 JI CASE STELCO BLAST F/COKE OVEN
FIGURE 42
GEOMETRIC MEAN
220
200
180
160
140
120
100
80
60
40
20
0
75
46
66
13
39
18
48
16
122
75
50
10
TSP
Fe
Mn
FC
TC
CO3
NORTHEAST DOWNWIND
SOUTHWEST UPWIND


UPWIND VS DOWNWIND MEANS
29535 STEL CHEM LB STELCO BLAST F/COKE
FIGURE 43
GEOMETRIC MEAN
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
122
14
94
256
64
74
100
77
202
148
60
280
TSP
Fe
Mn
FC
TC
CO3
WEST DOWNWIND
NORTHEAST UPWIND


UPWIND VS DOWNWIND MEANS
29533 STEL CRANE / STELCO BOF/HECKETT
FIGURE 44
GEOMETRIC MEAN
220
200
180
160
140
120
100
80
60
40
20
0
147
52
98
23
83
22
58
18
139
48
90
30
TSP
Fe
Mn
FC
TC
CO3
SOUTHWEST DOWNWIND
NORTHEAST UPWIND


UPWIND VS DOWNWIND MEANS
29533 STEL CRANE / STELCO COAL PILES
FIGURE 45
GEOMETRIC MEAN
220
200
180
160
140
120
100
80
60
40
20
0
182
52
162
23
101
22
92
18
158
48
120
30
TSP
Fe
Mn
FC
TC
CO3
WEST DOWNWIND
NORTHEAST UPWIND

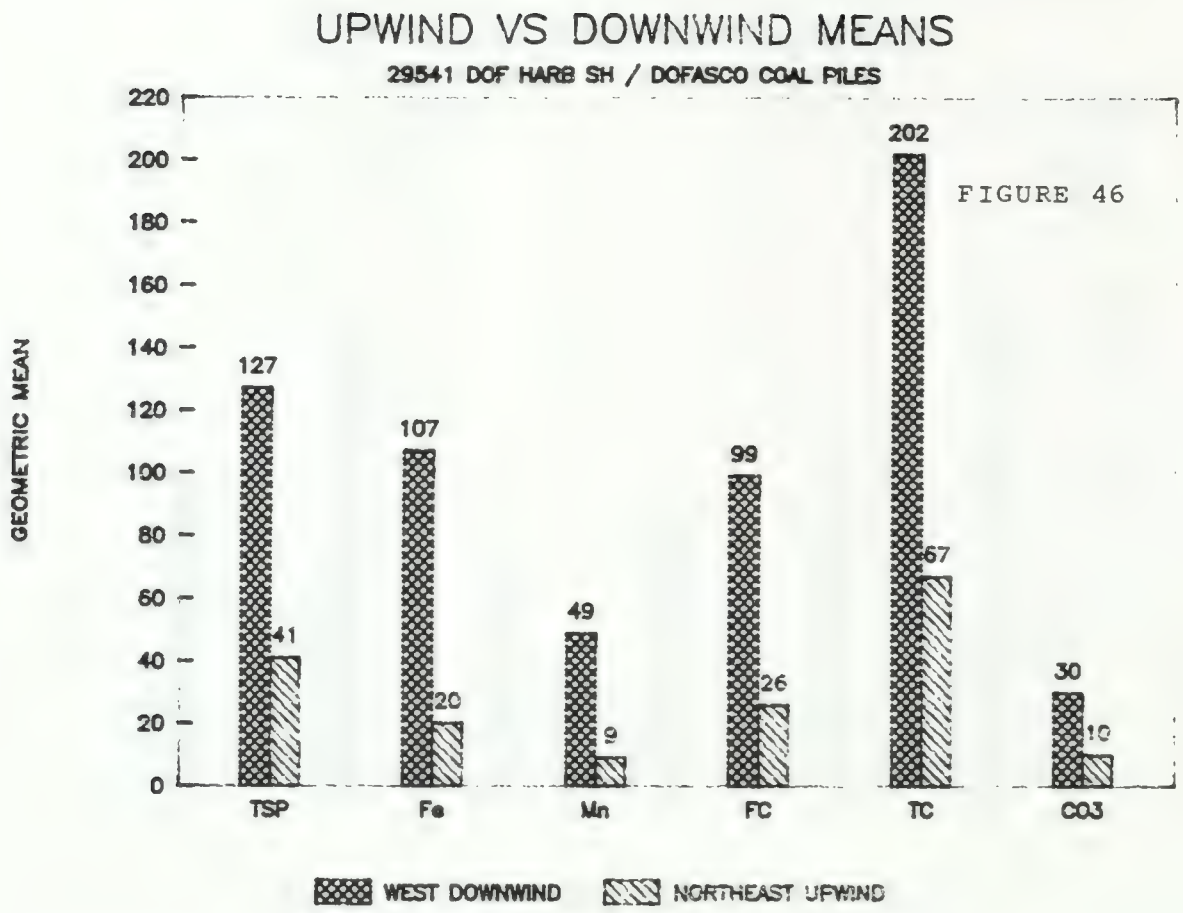

UPWIND VS DOWNWIND MEANS
29541 DOF HARB SH / DOFASCO COAL PILES
GEOMETRIC MEAN
220
200
180
160
140
120
100
80
60
40
20
0
127
41
107
20
49
9
99
26
202
67
30
10
TSP
Fe
Mn
FC
TC
CO3
WEST DOWNWIND
NORTHEAST UPWIND

FIGURE 46

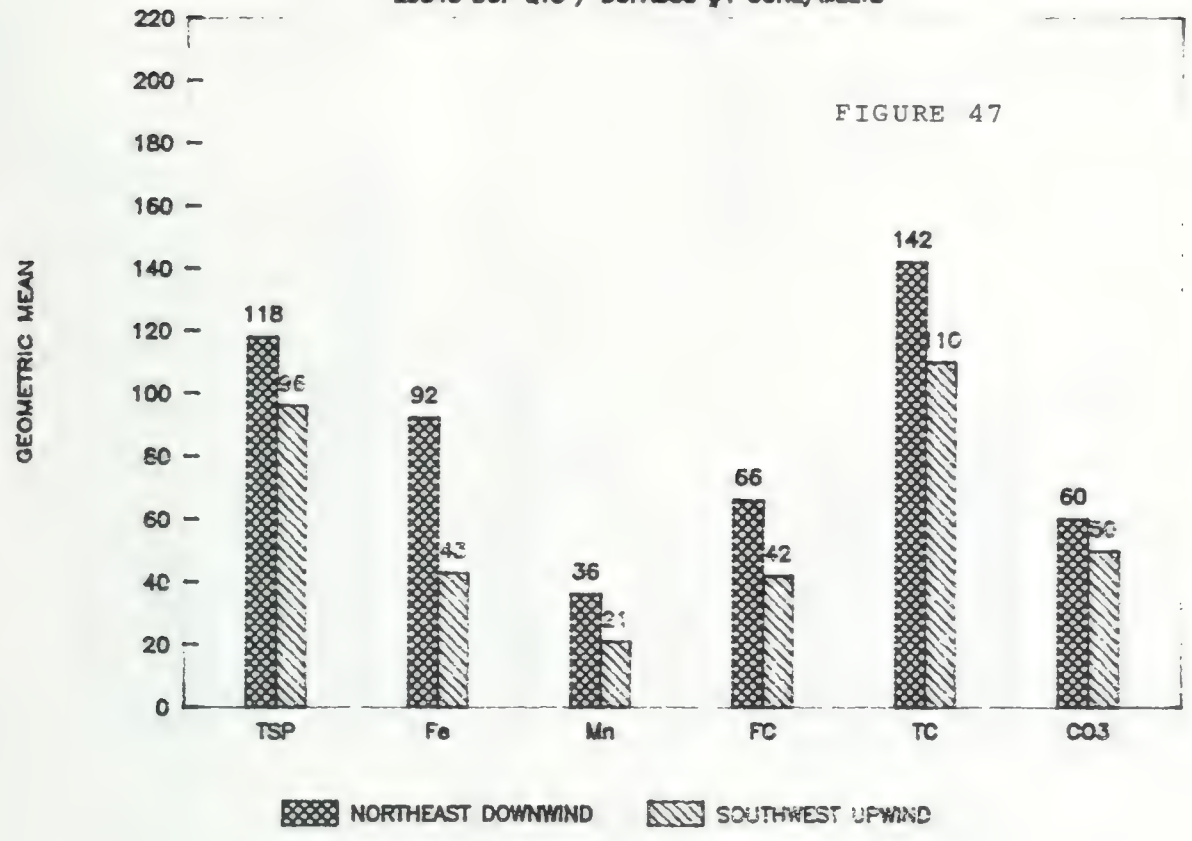


FIGURE 47

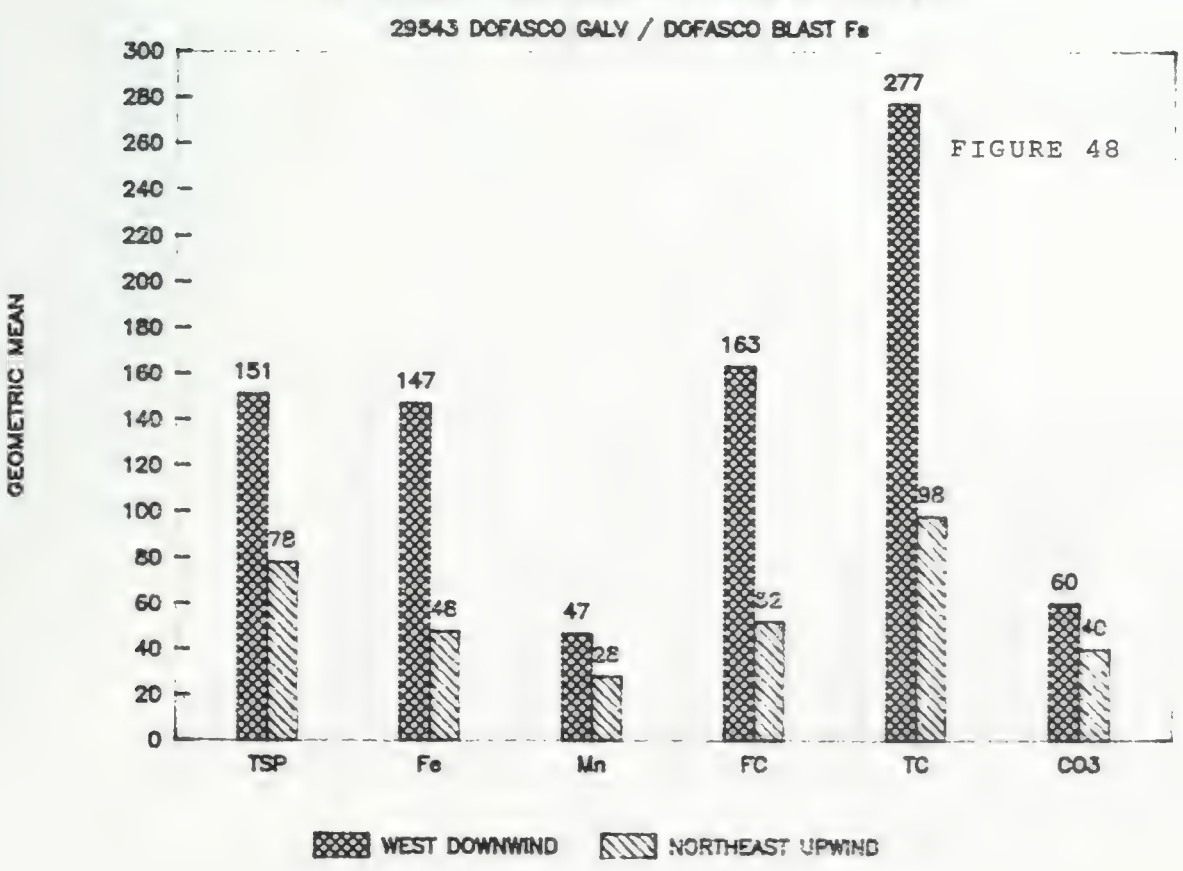
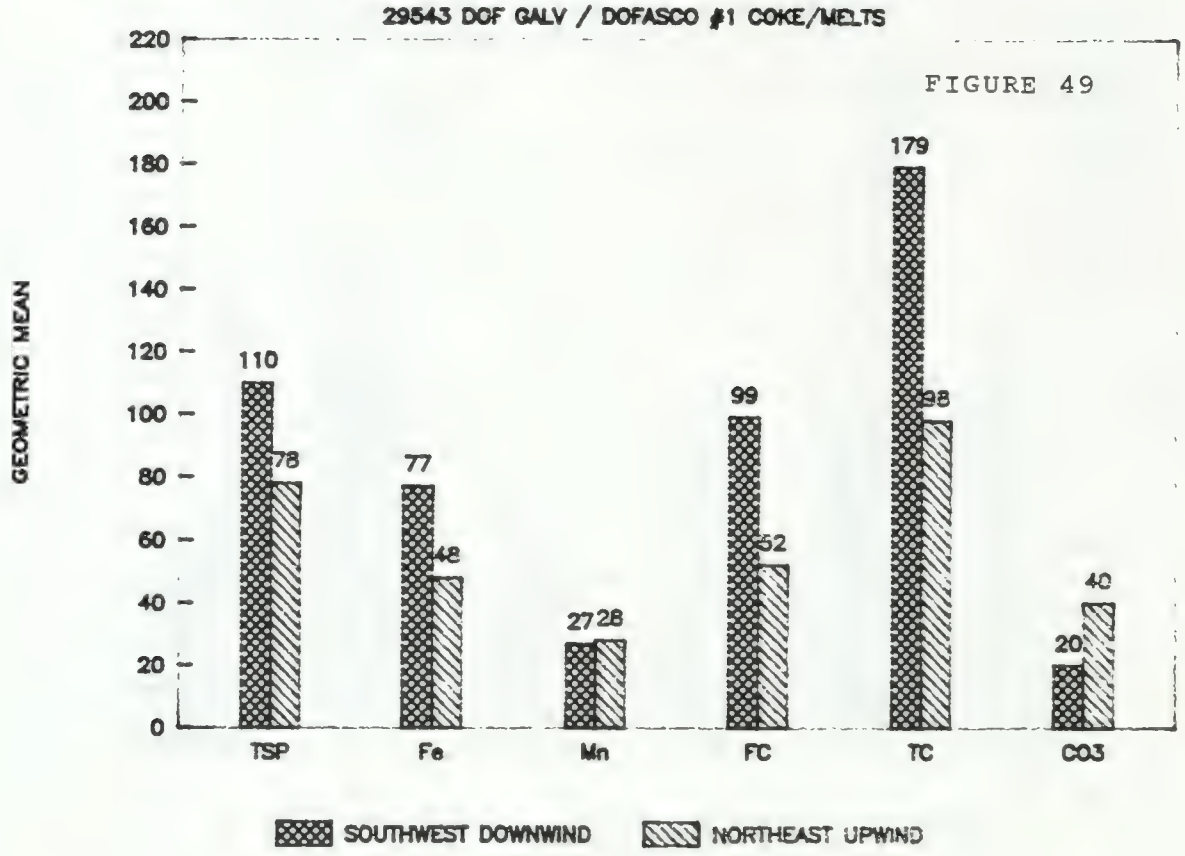


FIGURE 48

UPWIND VS DOWNWIND MEANS

29543 DOF GALV / DOFASCO #1 COKE/MELTS

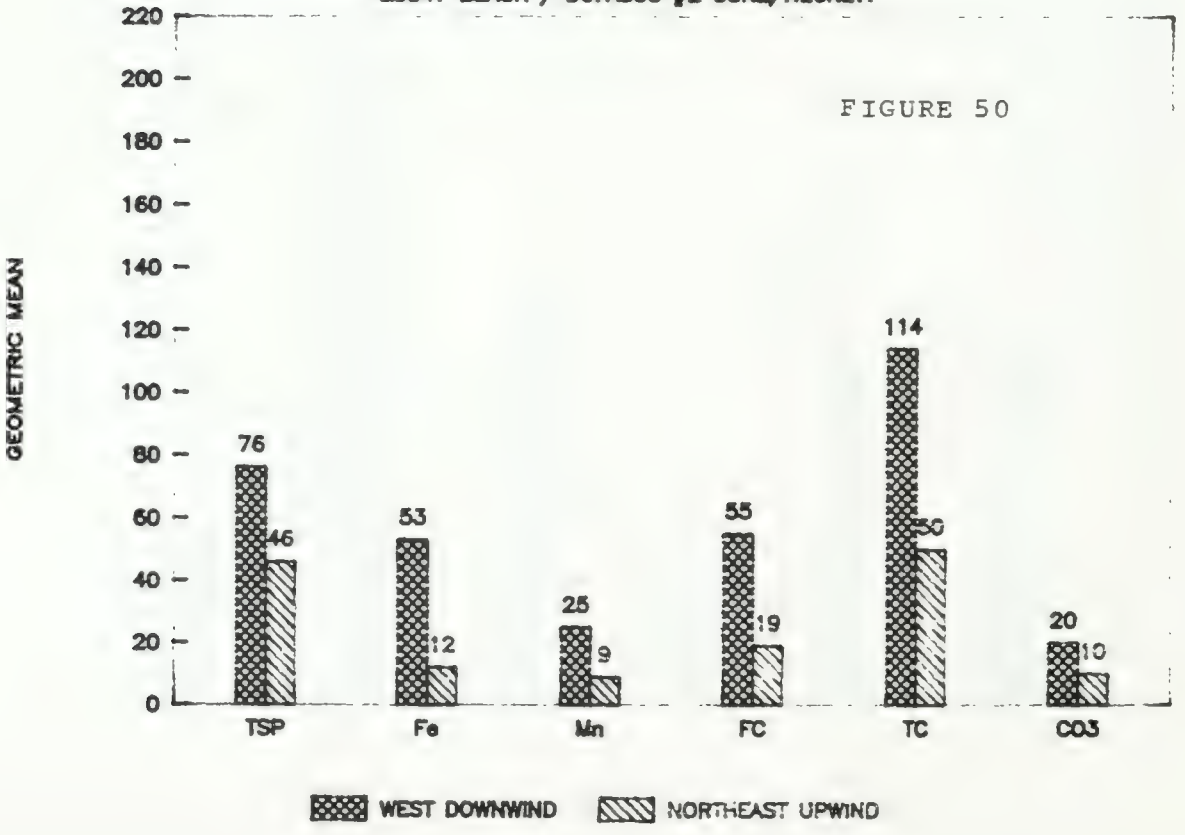
FIGURE 49



UPWIND VS DOWNWIND MEANS

29547 BEACH / DOFASCO #2 COKE/HECKETT

FIGURE 50



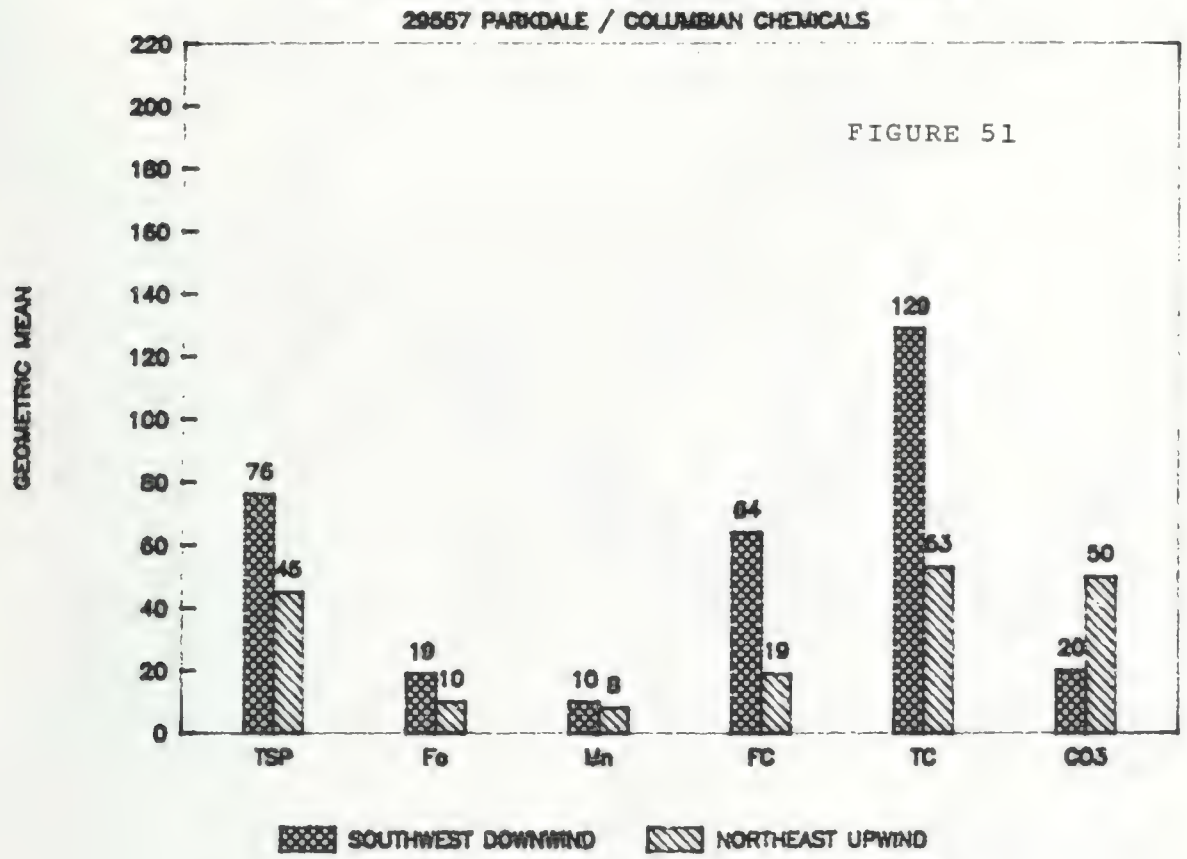


FIGURE 51

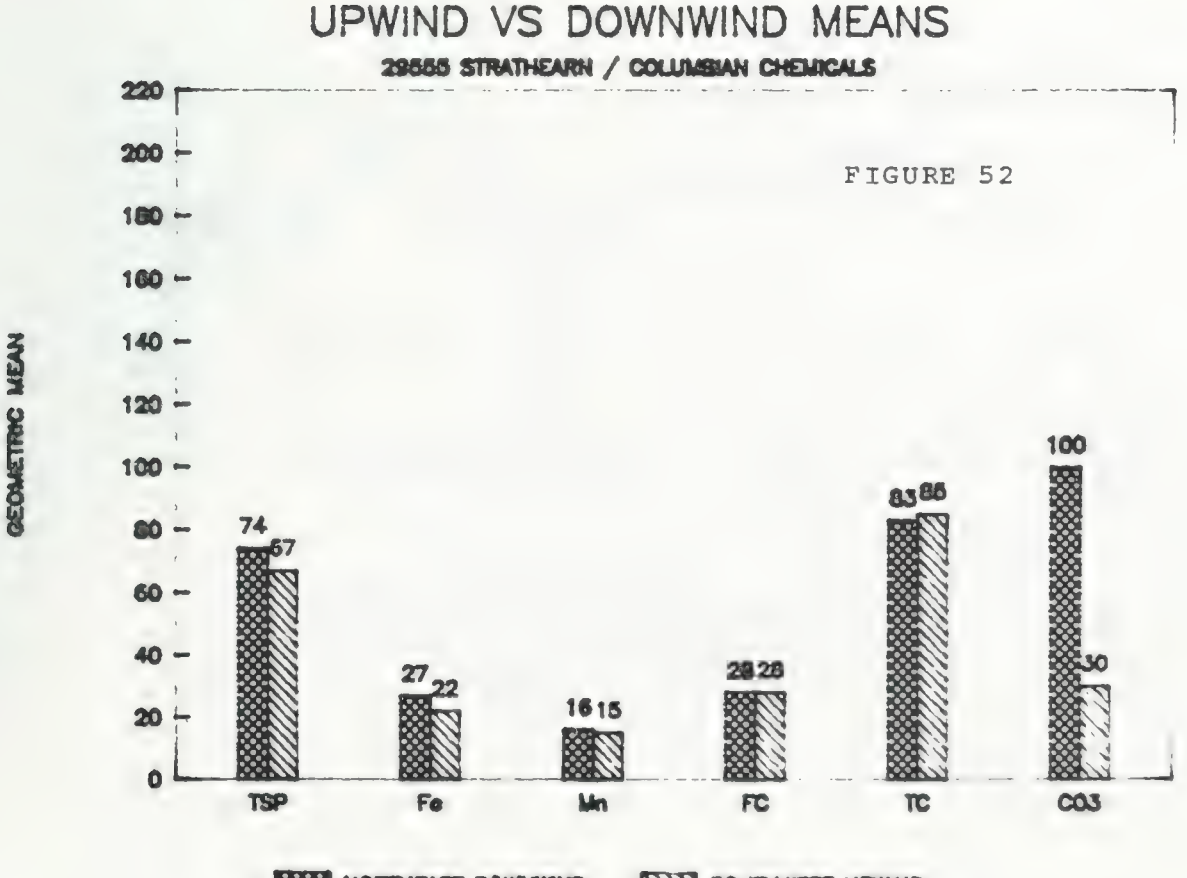
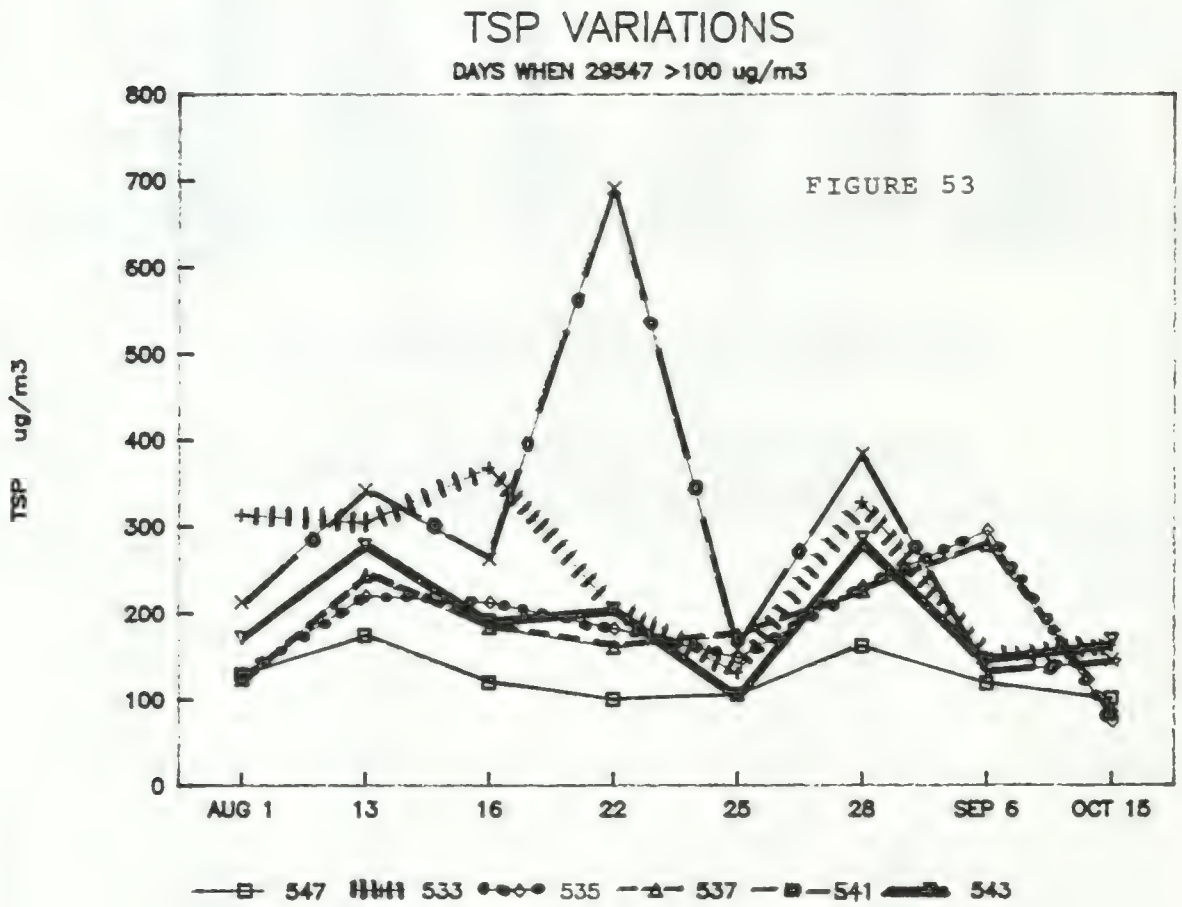


FIGURE 52


TSP VARIATIONS
DAYS WHEN 29547 >100 ug/m3
FIGURE 53
TSP ug/m3
800
700
600
500
400
300
200
100
0
AUG 1
13
16
22
25
28
SEP 6
OCT 15
547
533
535
537
541
543

IRON VARIATIONS

DAYS WHEN 29547 TSP >100 ug/m3

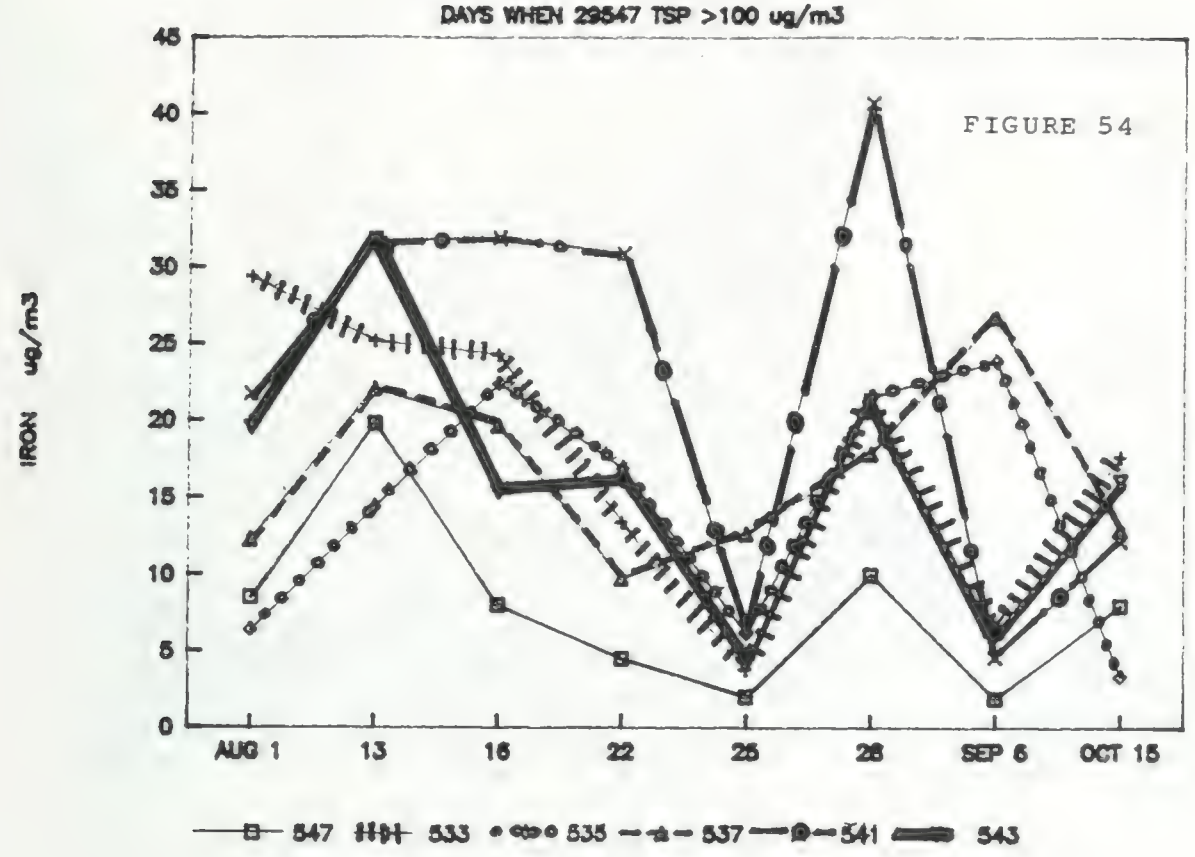


FIGURE 54

MANGANESE VARIATIONS

DAYS WHEN 29547 TSP >100 ug/m3

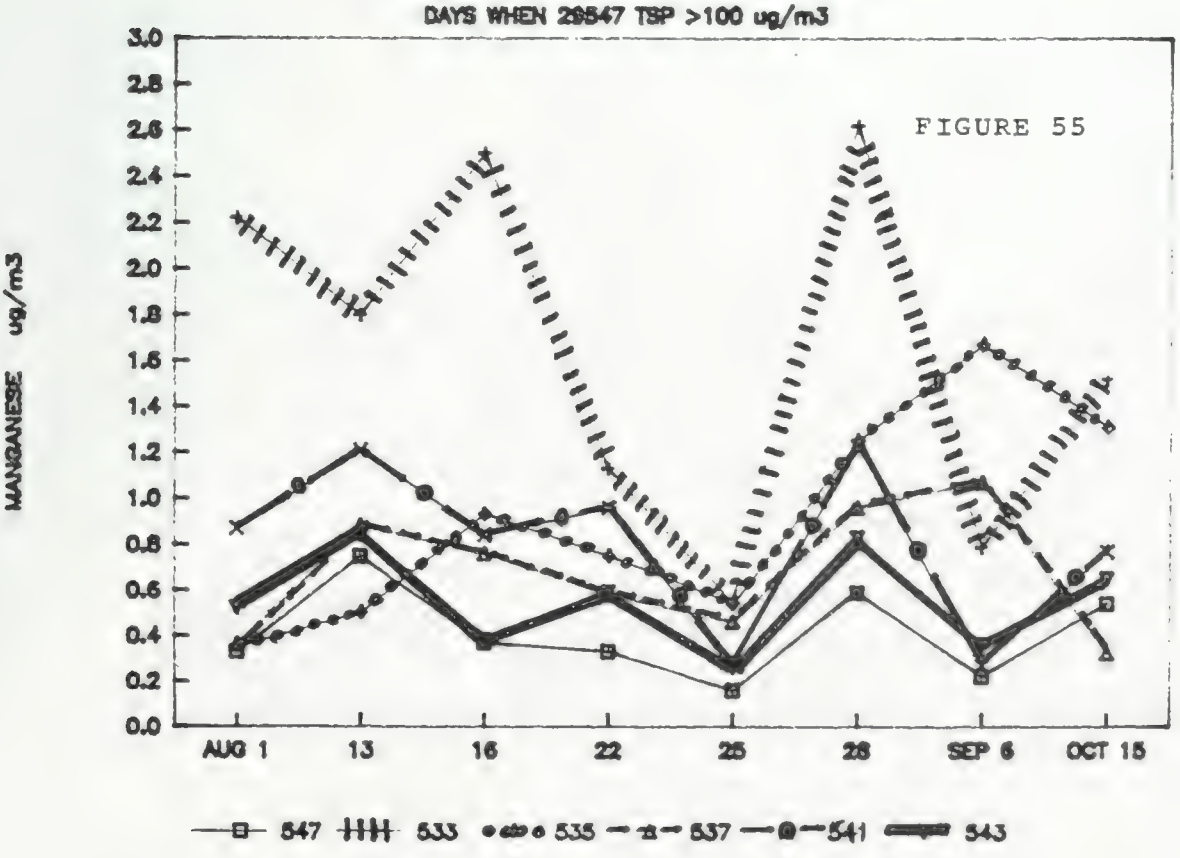
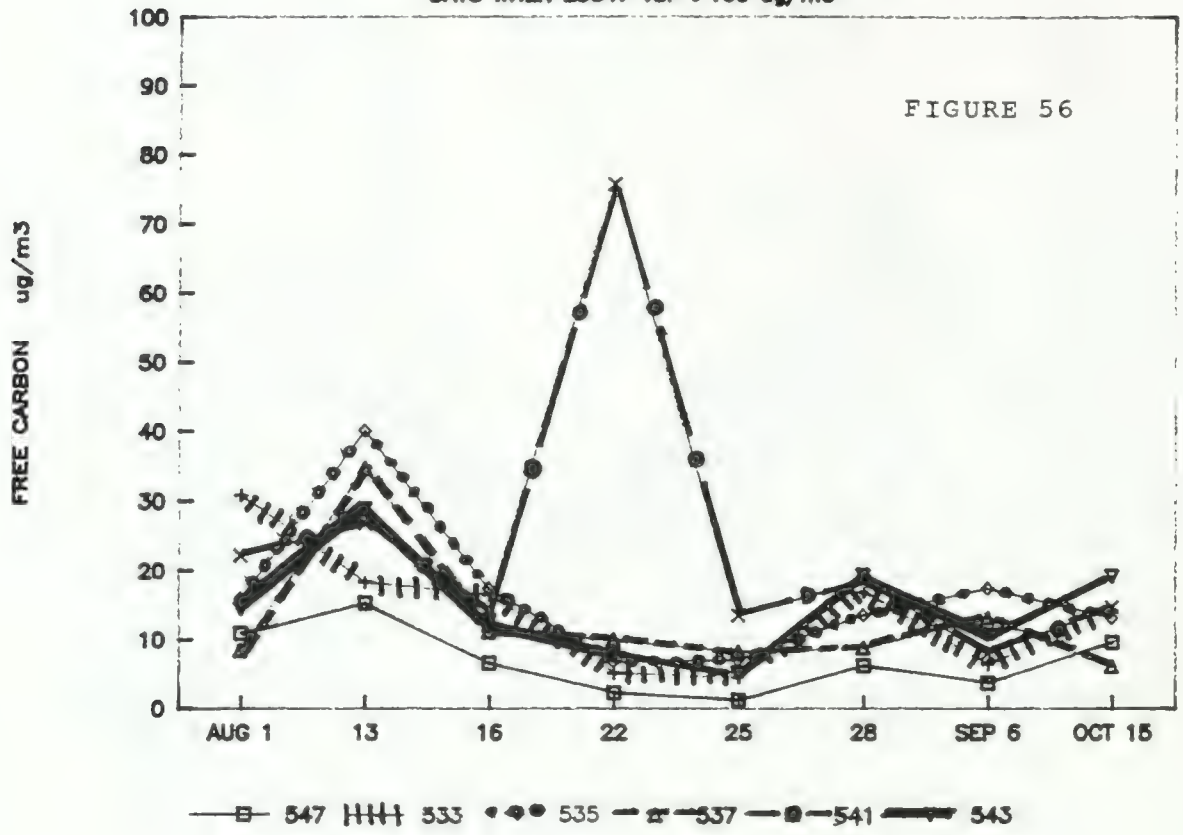


FIGURE 55

FREE CARBON VARIATIONS

DAYS WHEN 29547 TSP >100 ug/m3

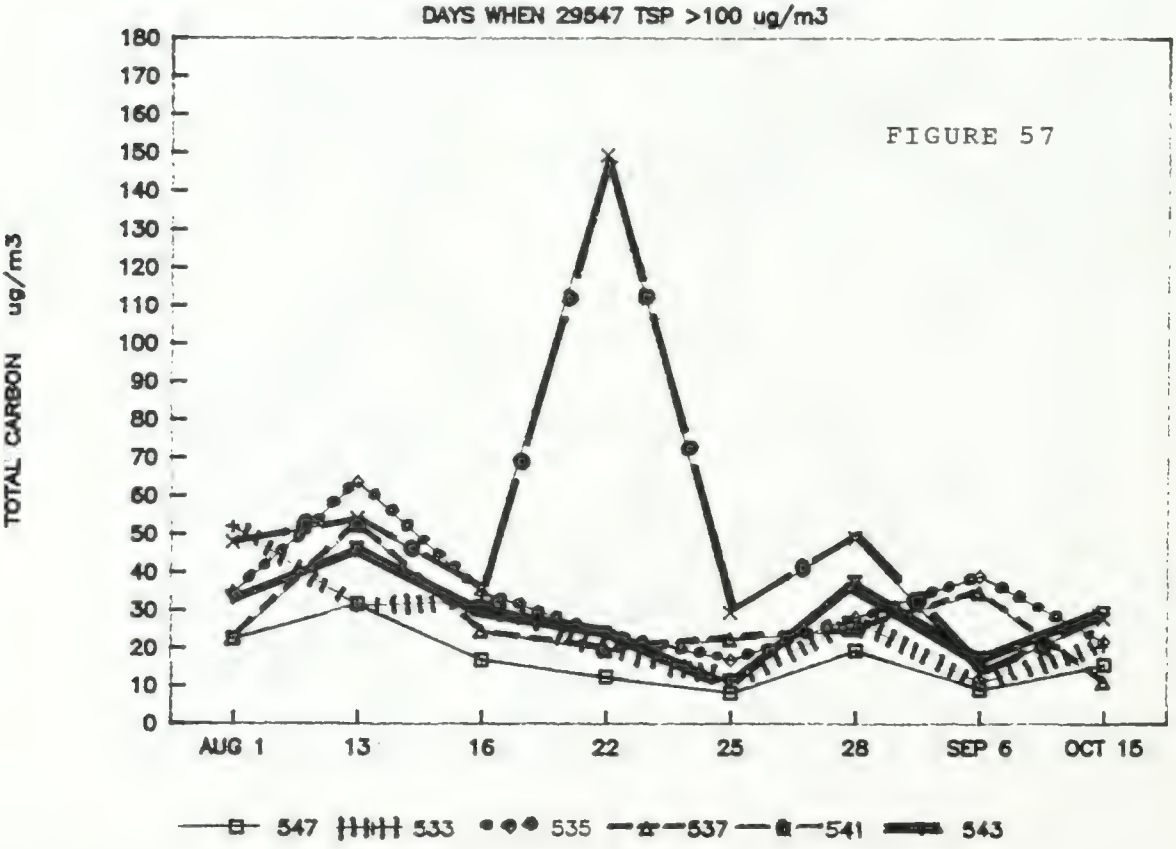
FIGURE 56



TOTAL CARBON VARIATIONS

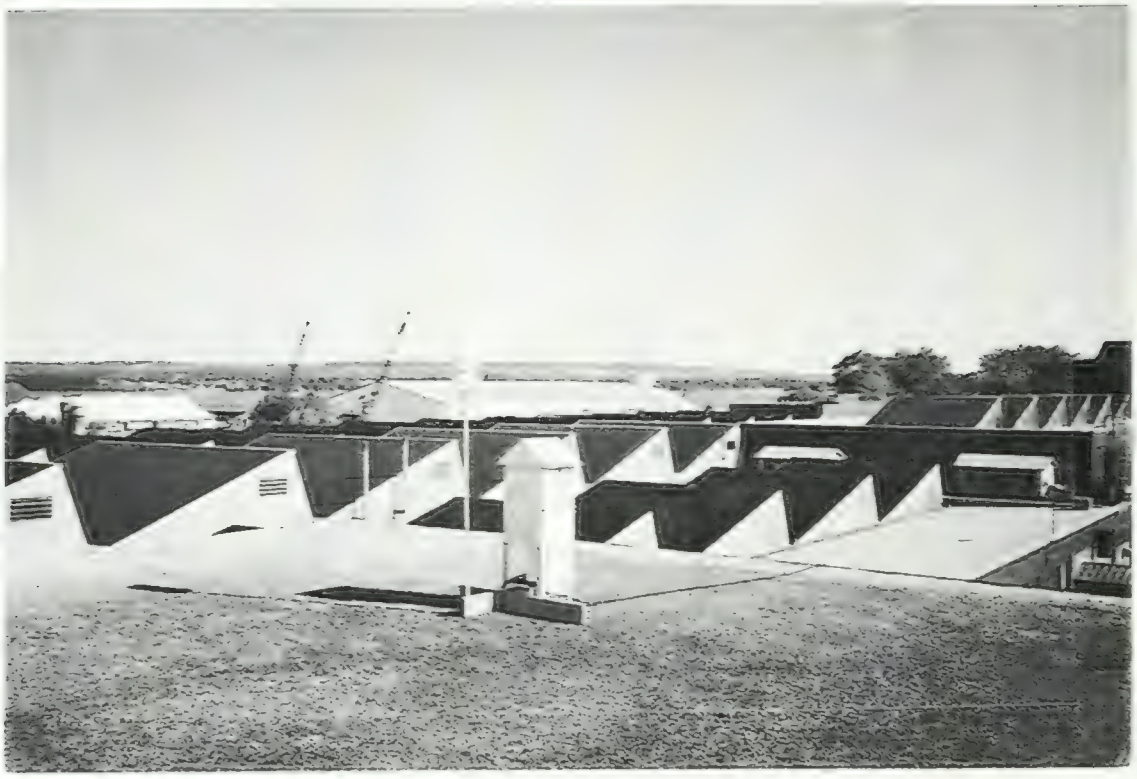
DAYS WHEN 29547 TSP >100 ug/m3

FIGURE 57



APPENDIX A

STATION PHOTOGRAPHS



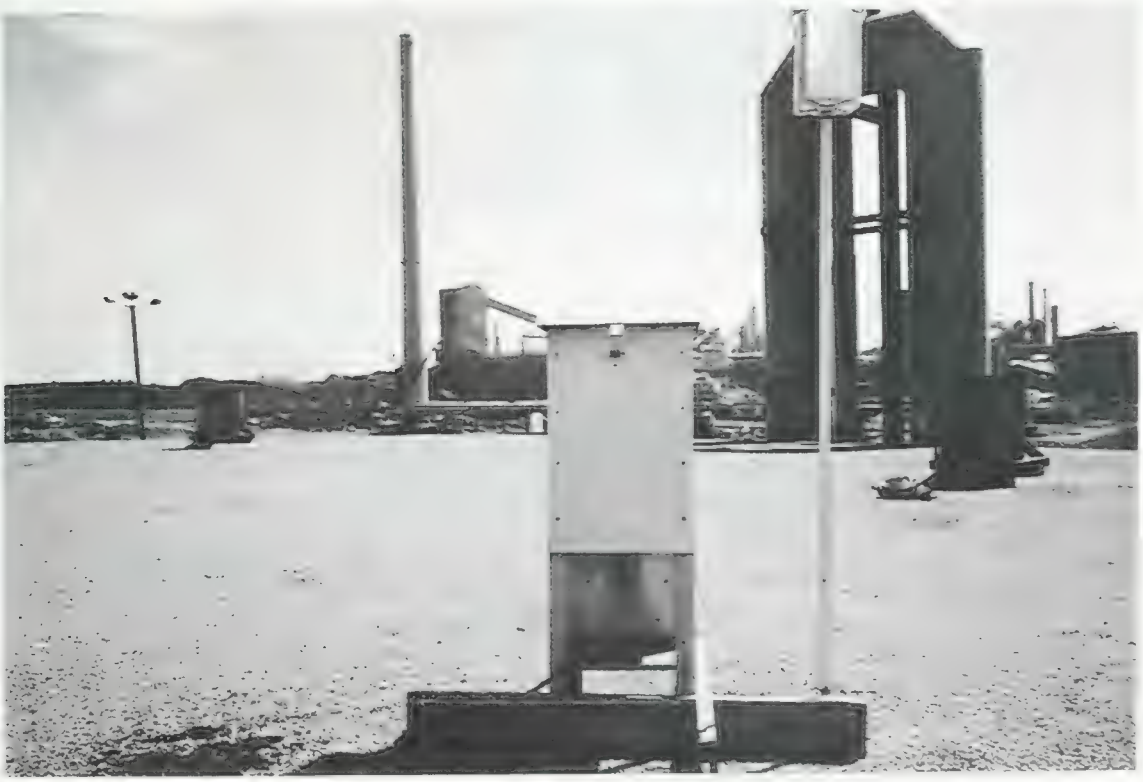
[illegible]

[illegible]

[illegible] Chem Lab North Hawaii [illegible]

[illegible] Chem Lab East Hawaii [illegible]

[illegible]



[illegible]

1933 Steamer General Office Warren Hirst & Co.

1933 Steamer General Office Rear Hirst & Co.

1954 Defoe Harbour Entry South Rivoli DSJ

1954 Defoe Harbour Entry West Rivoli DSJ

Defasco Galvanizing Line South Hawaii & OAU

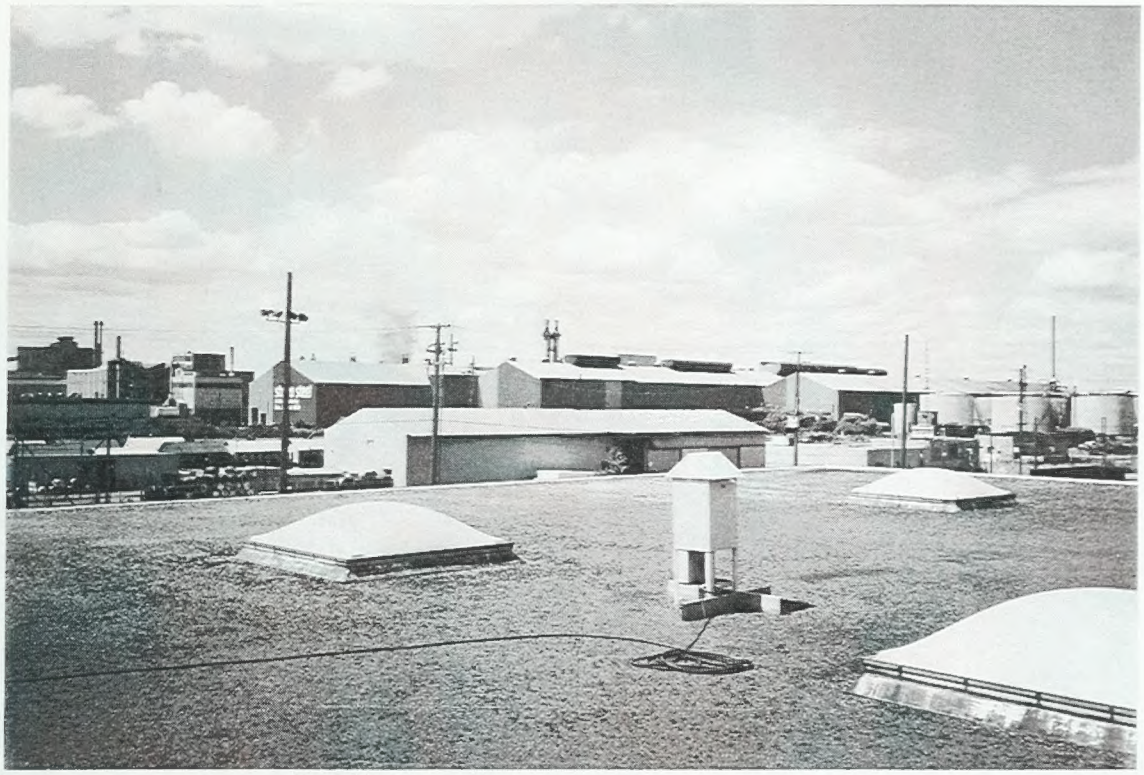
Defasco Galvanizing Line West Hawaii & OAU

[illegible] Interior Quality Center Tarmac - Final 8 25.

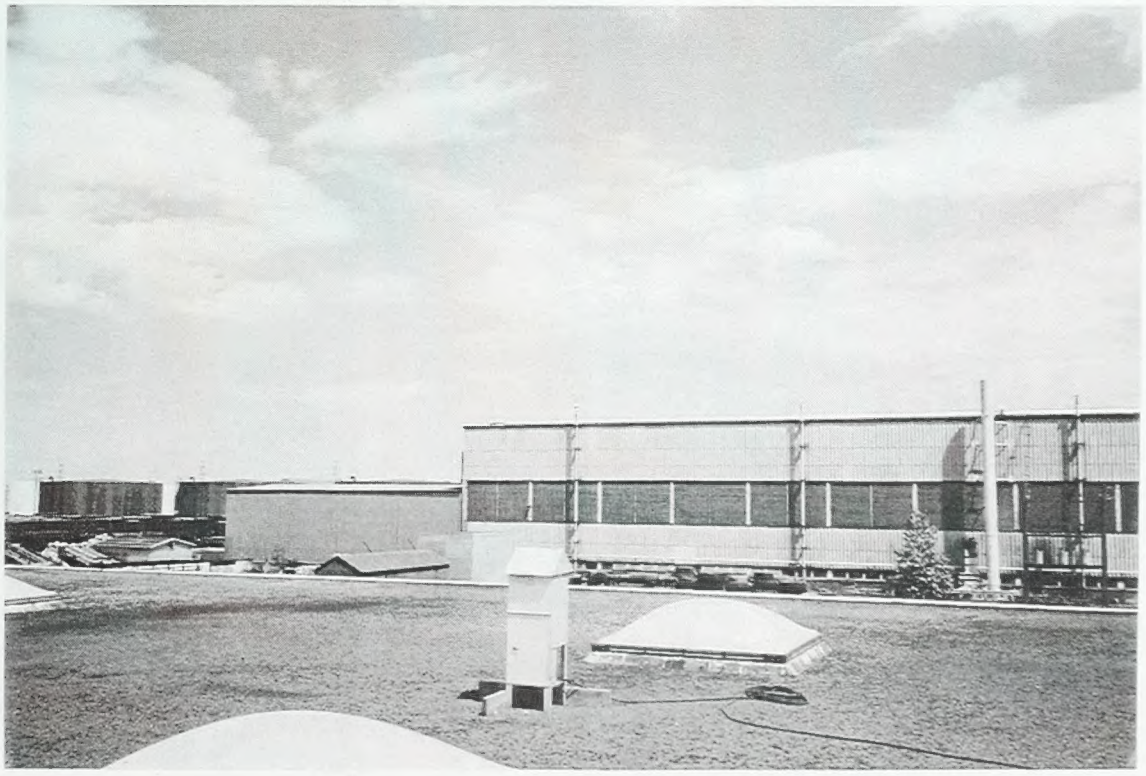
[illegible] Interior Quality Center East - Final 8 25

[illegible] Beach Storm Pier 18 South - Mile 1 ½ DPJ

[illegible] Beach Storm Pier 18 West - Mile 1 DPJ

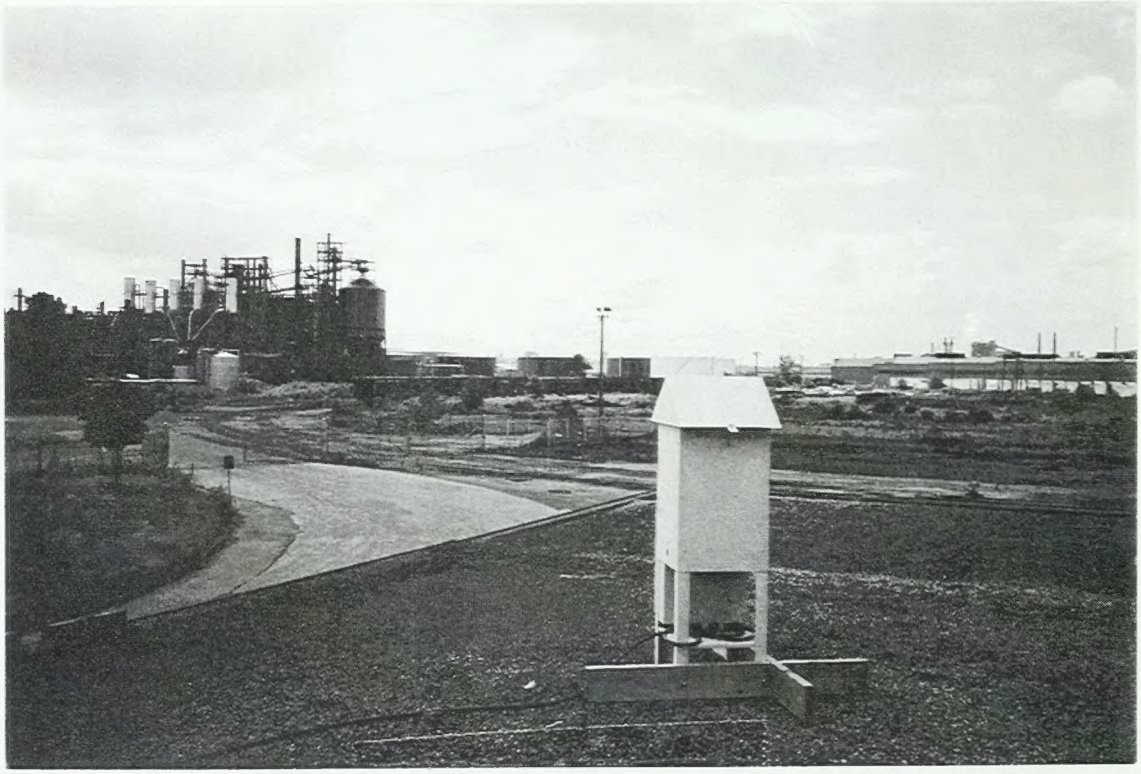


29555 Strathearn Dofasco #8 Plant Stores North Hivol & DFJ



29555 Strathearn Dofasco #8 Plant Stores East Hivol & DFJ

29557 Parkdale Philips Rod Mill South Hivol



29557 Parkdale Philips Rod Mill West Hivol